The Engineering and Mining Journal

WITH WHICH IS CONSOLIDATED "MINING AND METALLURGY."

VOL. LXXVII. NEW YORK, THURSDAY, MARCH 10, 1904. No. 10

THE ENGINEERING AND MINING JOURNAL. ESTABLISHED 1866

PUBLISHED EVERY THURSDAY,

261 BROADWAY, NEW YORK

TELEPHONE 6865 CORTLANDT. P. O. BOX 1833.
CABLE ADDRESS "ENGMINJOUR" NEW YORK.

T. A. RICKARD . . . . . EDITOR
FREDERICK HOBART, SAMUEL SANFORD . . . ASSOCIATE EDITORS

SPECIAL CONTRIBUTORS.

NEW YORK . . . . . R. W. RAYMOND, J. PARKE CHANNING, JOHN A. CHURCH, ROBERT T. HILL, JOSEPH STRUTHERS
BOSTON . . . . . W. R. INGALLS
PHILADELPHIA . . . . . F. LYNWOOD GARRISON, R. A. F. PENROSE, JR.
SCRANTON, PA. . . . . WM. GRIFFITH
ANSTED, W. VA. . . . . W. N. PAGE
SPRINGFIELD, ILL. . . . . EDWARD H. COXE
WASHINGTON . . . . . S. F. EMMONS, EDWARD W. PARKER, J. E. SPURR, W. H. WEED
DENVER . . . . . PHILIP ARGALL, CHESTER W. PURINGTON
SAN FRANCISCO . . . . . LOUIS JANIN, JR., CHARLES G. YALE
LONDON . . . . . A. G. CHARLETON, HENRY F. COLLINS, J. H. CURLE, T. KIRKE ROSE
SOUTH AFRICA . . . . . T. LANE CARTER, G. A. DENNY
AUSTRALIA . . . . . DONALD CLARK, F. DANVERS POWER

HORACE M. SWETLAND . . . . . PRESIDENT
J. T. MORRIS, Manager. F. J. PRATT, Treasurer

BRANCH OFFICES:

CHICAGO, Tel: Harrison 3326 . 520 Monadnock Block
PITTSBURG, Tel. 504 Court . 701 Keystone Building
DENVER . . . . . 206 Boston Building
SALT LAKE CITY . . . . 76 East Fifth South St.
BUTTE, MONTANA . . . . . 19 & 20 Owsley Block
SAN FRANCISCO . . . . . 168 Crocker Building
LONDON, ENGLAND . . . . 20 Bucklersbury, E. C.
DORTMUND, GERMANY . . . . . Arndt Strasse, 56

SUBSCRIPTION, payable in advance, $5.00 a Year of 52 numbers, INCLUDING POSTAGE in the UNITED STATES, CANADA, MEXICO, CUBA, PORTO RICO, HAWAII or the PHILIPPINES.

To FOREIGN COUNTRIES, INCLUDING POSTAGE, $8.00 or its equivalent: 33 Shillings; 32 Marks; or 40 Francs.

NOTICE TO DISCONTINUE
Should be WRITTEN to the New York Office in every instance.

Copies are on sale at the news-stands of the following hotels:—Waldorf-Astoria, New York; Brown Palace, Denver; Palace Hotel, San Francisco, and the leading hotels in the principal cities.

ADVERTISING COPY.
Should reach NEW YORK office by MONDAY morning of issue week; CHANGES OF COPY by the PRECEDING THURSDAY.

Copyright, 1904, by
THE ENGINEERING AND MINING JOURNAL.
Entered at New York Post Office as 2nd Class matter.

CONTENTS.

Editorials:
Notes 387
The Engineering Building..... 388
The Mineral Production of Canada..... 388
Mining Education on the Rand..... 388
Will the Bituminous Coal Miners Strike?..... 389
Market Conditions 389
Metallics 389
*B. T. A. Bell..... 390
An Explosion of Fire Damp from Rotting Timbers 390
Discussion:
Pyrite Smelting.....*W. H. Nutting* 391
Mining in Rhodesia.....*Wallace Broad* 391
Cyanidation of Sands.....*J. E. Johnson, Jr.* 392
The Mineral Production of Canada in 1903..... 393
Gas, Coke, Tar and Ammonia Products..... 394
*Copper Losses in Blast-Furnace Slags, *William A. Heywood* 395
*The Framing of Rectangular Shaft Sets, *Wilbur E. Sanders* 396
*The Gallitzin Plant of the Pennsylvania Coal & Coke Company 398
The Bessemer Converter in Basic Steel Making.. 399
The Canadian Mining Institute..... 400
Notes on Some Re-Grinding Machines, *Martin Schwerin* 403
*A Cantilever Battery Frame.....*Ira C. Boss* 404
Recent Literature on Economic Geology, *Edwin C. Eckel* 406
Books Reviewed 406
Correspondence:
The Salpo Mining District, Peru.....*G. R. G.* 407
Abstracts of Official Reports:
Rhode Island Copper Company..... 407
American Iron & Steel Manufacturing Company 407
Quincy Mining Company..... 407
Questions and Answers..... 408
Recent Decisions 408
Patents Relating to Mining and Metallurgy:
United States 409
Great Britain 410

*Illustrated.

DEPARTMENTS.

Assessments 424
Chemicals and Minerals:
New York 422
Foreign 423
Coal Markets:
United States 419
Foreign 420
Dividends 424
Financial Notes:
Gold and Silver Movement..... 423
Prices of Foreign Coins..... 422
Industrial Notes 413
Iron and Steel Markets:
United States 420
Foreign 421
Metal Markets:
Silver 423
Copper, Tin, Lead, Spelter and Minor Metals.. 424
Average Monthly Prices Tables..... 424
Mining News:
Summaries: Denver, San Francisco..... 411
London; Perth, W. A.; San Luis Potosi, Mex.; Victoria, B. C..... 419
United States 414
Foreign 419
Mining Stocks:
Market Reviews 418
Quotations 425, 426
Obituary 413
Personals 413
Schools, Technical 413
Societies 413
Trade Catalogues 414

EDITORIAL.

ON ANOTHER PAGE we publish an eminently practical contribution on re-grinding machines. This is a matter vital to good work in concentration mills, therefore it will prove of service to many of our readers. The moral of all such discussions, beyond bringing out the results achieved by particular types of machinery, is the obvious one that each machine has its special field and no single one of them—stamps, Huntingtons, rolls, Chilean mills, ball-mills—is able to cover the great variety of ores or the multiplicity of conditions arising in the course of ore reduction. Mr. Schwerin emphasizes this feature and proves how misleading it becomes to recommend any one machine in that vaguely general and truly magnificent manner which is unfortunately much too common among some professional men.

WE GIVE CONSIDERABLE space elsewhere in this issue to the report of the proceedings of the annual meeting of the Canadian Mining Institute. Our readers will find there as full a report of this gathering of the active and progressive mining men of the Dominion as space permits. The meeting was the first one since the present organization of the Institute held outside of the headquarters at Montreal, taking place this year in Toronto. Notwithstanding the cloud thrown over it by the untimely death of Secretary Bell, it was a highly successful meeting, alike in point of numbers, the value of the papers presented, the general interest shown in the proceedings, and in the discussions. While it is difficult to select any special articles for mention, it may be said that among the more purely technical papers especial interest was shown in those on the exploration of the Ontario iron ranges, on magnetic separation, and on the discovery in Quebec of minerals containing radium; while of what may be called the economic papers that on the undeveloped mineral resources of Ontario was of special value. Among the general papers great attention was given to, and animated discussions followed, Professor Walker's address on the educational aspects of the Geological Survey and President Coste's carefully prepared paper on the mining laws of the Dominion and of Ontario.

It is not too much to say that this meeting

was in all respects creditable to the Institute, and will still further help to establish its claim as a body thoroughly representative of Canadian mining interests.

WE REFERRED, not long ago, to a period of reduced demand in the iron trade as one usually favorable to the introduction of improvements and economies, and it seems that this anticipation has already begun to be realized. It is well known that since the organization of the United States Steel Corporation, a sort of competitive system has been organized among the different plants of the corporation, by which periodical comparisons of costs are made, and inducements are held out to the managers to reduce the expenses of production as much as possible. Under the stimulus of this competition, it is claimed that at some of the blast-furnace plants the cost of labor has been cut down to a figure as low as 50 cents per ton of pig iron produced; and in one case, according to the Cleveland *Iron Trade Review*, the labor cost has been as low as 47 cents per ton. It is understood also that some reduction in fuel has been secured at several of the corporation plants. This, however, was to be expected, since it is well known that the consumption of fuel per ton of pig iron is always somewhat higher when a blast-furnace is driven to its full capacity than it is when the stack is running more easily and making less iron. Other economies may be expected to follow; although we have not heard yet of any plans for the introduction of improvements, such as the utilization of waste gases, or the more extensive use of by-product coke.

THE ENGINEERING BUILDING.

By a majority of 477 in a total vote of 1,801, the American Society of Civil Engineers decided to decline in joining the other three engineering associations in accepting Mr. Carnegie's offer to provide funds for a central building. This was the result of the letter-ballot, and it must be taken as conclusive of the views of the civil engineers.

The action of the civil engineers was not unexpected, for the circulars sent out exhibited a large preponderance of skill in giving arguments against the proposal.

Now comes the question whether the project will be abandoned or whether Mr. Carnegie will continue his generous proposal to the other three societies, representing the mechanical, mining and electrical engineers. We understand that the matter is under advisement, with the possibility of a favorable outcome. There are many other technical societies willing and able to become tenants in the proposed building, certainly more than enough to utilize profitably the space which was to have been allotted to the civil engineers. It is hoped, therefore, that Mr. Carnegie will not be deterred by the self-interested, but not unreasonable, action of one of the four engineering societies from carrying out a broad-gauge idea which will be of great benefit to the technical professions as a whole.

THE MINERAL PRODUCTION OF CANADA.

The preliminary report of the mineral production of Canada for 1903, which is given on another page, presents many points of interest. In the first place, great credit is due to the Mines Sections of the Geological Survey for the completeness of the statement, and the promptness with which it is brought out. This section, it must be remembered, has an immense stretch of country to cover, extending from Nova Scotia to the Yukon, and the limitations imposed by Parliament compel it to execute this work with a very limited force. Under these circumstances the completion and issue of the statement two months after the close of the year must be regarded as a notable achievement.

The value of the mineral output for the year shows a decrease of $659,489 from the total reported for 1902, and of $3,112,648 from that for 1901, which was the highest point ever attained. This decrease, however, was wholly due to the falling off in the production of placer gold in the Yukon, a movement which was inevitable from causes to which we have often referred heretofore. Aside from this Yukon gold there has been a remarkable gain, and the output from Canadian mines and quarries last year was more than three times that for 1895, and more than ten times that for 1886, when this series of reports was begun.

In addition to the decrease in gold there was a falling off in the output of pig iron, which is mainly due to temporary causes and to the embarrassments of one or two of the leading iron producers; causes which, it may be expected, will soon be overcome. In the production of other metals there was a considerable increase, notably in copper, the latter being due mainly to the development of the mining and smelting industries in the Boundary district of British Columbia. A very interesting statement is to be found in the complete report of the production of the nickel-copper deposits of the Sudbury region in Ontario, from which, for the first time, we obtain an accurate idea of the production of ore, the work of the smelters and the value of the shipments.

The coal and coke output shows an important increase, which was spread all over the Dominion. The Nova Scotia coal mines in the East, and those in the coast district of British Columbia did well, while there was a large gain in the Crow's Nest Pass district in British Columbia, and a promising beginning was made in the Northwest territories, where the increasing population has caused a local demand for fuel.

Many interesting details of the production will be found in the statistics referred to. Upon the whole, the statement must be regarded as an encouraging one, showing in the main a steady advance in the important mining industries of the Dominion.

MINING EDUCATION ON THE RAND.

Among the earnest efforts to direct mining education into a practical channel, none appears more likely to succeed than that recently started under the direction of the Transvaal Technical Institute. The council of this organization consists of eleven members, only three of whom are government officials, the others being leading technical men nominated by an education commission and by the Transvaal Council of Education. The last mentioned holds in trust $500,000 for educational purposes on the Witwatersrand and is contributing one-third of the actual cost of starting a school of mines at Johannesburg; the government contributes the other two-thirds, and the same beneficent agency has voted $150,000 for the building fund. The School of Mines is to be opened during the current month and will start with about 50 students, all of whom have had two or three years' technical training, either at Kimberley or Cape Town, so that the Johannesburg School of Mines will afford them their final course. The mine managers of the district are co-operating heartily and have expressed their willingness to give the students every facility to get a practical insight into mining work alongside the teaching of the lecture room and laboratory. In London this Technical Institute has an advisory committee consisting of Professor H. A. Miers and Messrs. Hennen Jennings and H. H. Webb.

We proffer the most sincere good wishes for the success of an enterprise which exhibits so much sound sense and public spirit. That Messrs. Jennings and Webb are two representative American engineers is a graceful coincidence, which it is only too pleasant to emphasize.

In addition to these excellent plans for the School of Mines at Johannesburg, it is the intention, we believe, to create facilities whereby the graduate student from the Royal School of Mines will be able to go from London to take a post-graduate training of one year or more at the big mines on the Rand; this also is due to the generous instincts of several leading consulting engineers connected with the big financial houses controlling large groups of mines in the Transvaal.

Such a good work ought to win the wholehearted support of every member of the profession, and we mention it with keen satisfaction as indicating a new departure in mining education and as a suggestion to those who take a lively interest in the schools of mines of the United States. The moral is: Get professional men interested in the education of recruits

for their own profession; that is the way to make it practical, a training not for school alone but for life.

WILL THE BITUMINOUS COAL MINERS STRIKE?

Another joint conference between the representatives of the United Mine Workers and the coal mine operators of Illinois, Indiana, Ohio and Western Pennsylvania which assembled on February 29, at Indianapolis, adjourned on March 5 without reaching any agreement as to a wage-scale for the year beginning April 1. The previous conference failed, as was noted in the JOURNAL, because the miners' representatives insisted on the 1903 scale, while the operators held out for the 1902 scale.

The conference just closed was notable for the heat of the debate between the contending forces, and for some rather sharp passages at arms. The brunt of the contest was borne for the operators by Mr. F. L. Robbins, president of the Pittsburg Coal Company, while Mr. John Mitchell led the debate for the mine-workers. It is but fair to say that Mr. Mitchell, though having the unanimous backing of the miners' representatives, including, by the way, men from the anthracite region, who were in no way involved except as possible payers of strike assessments, did not bear himself with his accustomed ability, perhaps because his cause was bad. He made allegations which were promptly disproved and was frequently guilty of petty quibbling. Mr. Robbins, for the operators, stood firmly on the facts. He showed that the earnings of the Pittsburg Coal Company, to which reference was frequently made by the miners, were due largely to the abnormal profits obtained early last year, and that the company was now closing contracts at prices which, on the present wage-scale, left little profit. Coal from the Connellsville and Klondike fields was being taken by the United States Steel Corporation and other steel companies at 40 and even 50c. a ton below last year's prices, a reduction that the Pittsburg Company could not afford to meet without paying less for labor. Mr. Guthrie, representing Hocking Valley operators, stated that circular prices in his region were 70c. a ton less than when the convention was in session last year, and that new contracts were taken at reductions which, with present wages, leave a profit of about 2c. a ton on run-of-mine coal.

Evasion and misrepresentation could not weaken the force of such arguments as these, but the miners remained obdurate, many of them having received instructions from local lodges not to vote for any reduction. Finally, after discussion had accomplished nothing, the operators presented an ultimatum offering reductions from the present mining rates of 5 to 3c. a ton with corresponding reductions on other labor. The leaders of the mine workers were in favor of accepting this offer, but a majority of the miners' delegates would not vote for it, so the offer is to be submitted to a referendum vote, and the result is to be made known on March 17.

The adjournment of the conference without the signing of a scale, though not unexpected, does not mean that a great strike is imminent, for much can happen before April 1. In fact, were this not a presidential year, when every labor demagogue willing to pocket the wages offered by the proprietor of a string of yellow journals will try to arouse prejudice and hatred among the thoughtless and ignorant to the end that reason may be dethroned and folly glorified, the outcome would not be in doubt at all. The fact that men like Mr. Mitchell oppose a strike must count for much. A strike of any duration would very likely result in the utter wreck of interstate agreements in the bituminous regions concerned, and none knows better than Mr. Mitchell what these agreements have cost in time and money. Moreover, as Mr. Mitchell is shrewd enough to see that public opinion will not support the miners in asking 1903 prices for labor in the face of present conditions, it is quite likely he will do his best to bring about an adjustment.

Even though a strike comes, it is not likely to last long. In fact there have been rumors that many operators would like a short strike, for were consumers made to fear a coal famine prices would jump and operators could close contracts at terms that would enable them to pay 1903 wages without suffering loss. Yet on account of the political complications involved, it is not likely that the larger companies would sanction such a plan. Consequently, as the miners can scarcely expect any moral support, outside of labor unions, in striking against a small wage reduction when men in many other callings have had to take greater reductions; and as a strike might well disrupt the interstate agreement, so far as the operators are concerned, it is pretty clear that unless the rank and file of the mine workers are bereft of common sense they will take their medicine like men, and there will be no suspension of work when April comes.

MARKET CONDITIONS.

Mar. 9.

The metal markets have continued rather quiet, and everyone seems to be waiting for more decided developments. In copper, consumers are not generally supplied far ahead, but seem to hesitate about buying beyond their current requirements. On the other hand, sellers are not pressing metal, and prices are fairly stable. In tin there is nothing new to report. Lead remains steady at the recent advance with about the usual consumption. Spelter is firm with a very good current demand. The Joplin ore market shows a slight advance in prices.

In silver there is little change to report, and the market is dependent chiefly upon Eastern buying.

The iron markets are still somewhat irregular. Large sales of Southern pig iron are reported, but at reductions in price. The reported purchase of 130,000 tons of pig iron by the Steel Corporation, was, it appears, exaggerated, the actual buying being 65,000 tons, while options were taken for 65,000 tons more.

The western coal markets are excited and irregular, and will probably continue so until the question of the wage-scale for the coming year is settled. The conditions affecting this settlement are referred to at length in another column.

The seaboard bituminous market shows little relaxation from the anxiety of last week. Floods along the railroads are interfering with shipments, but loading ports are now quite clear of ice, and the conditions of coastwise traffic are improving. The prospect of the signing of a new mining wage-scale without a strike relieves the market.

In the anthracite trade milder weather affects retail demand, but wholesale trade continues active. Some mines are having trouble from floods, but the ice is going out of the rivers with less hindrance to shipments to the seaboard than was expected.

METALLICS.

Culled from all sources. Our readers are invited to assist this department by sending similar material.

The temptation to keep mining costs low, conformably with good returns, is naturally a strong one to managers. In cases where oreshoots are narrow, and the proportion of payable ore to the total ore developed is small, the proper charge for mine development is very high. In such cases, the manager is often tempted to include a certain tonnage of doubtfully payable ore, in order to distribute the heavy expenditure, which would otherwise appear against the lesser tonnage of actually payable ore.

When the transmission of power is required for a distance exceeding 100 ft., which is too great for leather or rubber belts, wire rope is used. The speed of rope so used should not exceed 1,200 to 1,600 ft. per minute over small sheaves, and the depression will be about 3 ft. in 100 ft. on the driving side and 5 to 6 ft. on the slack side.

Ilmenite is found in the Waihi mine workings, in New Zealand, and appears to be a constituent of the rhyolites, and perhaps of the andesites found there. In the form of black sand it is quite common on the Waihi plains. The analysis of this black sand showed titanium oxide, 42.3; ferrous oxide, 36.0; silica, etc., 21.7 per cent.

A black mineral taken from a cross-cut in the Waihi mine, in New Zealand, which consisted chiefly of hydrated manganese oxide and aluminum silicate, was found to contain over one per cent of nickel and cobalt oxides, the nickel predominating. A small percentage of nickel is found in the oxidized ore of the Waihi mine. Nickel and cobalt were found some years ago in the ore of the Waitekauri mine. These metals, especially cobalt, were precipitated with the bullion in the zinc-boxes, and gave rise to infusible masses during the melting of the slimes. Traces of cobalt and nickel occur also in the Karangahake reefs.

B. T. A. BELL.

Benjamin T. A. Bell, widely known throughout Canada for his long connection with the mining industry and his many excellent personal qualities, died at his residence in Ottawa, March 1. His death was the result of an unfortunate accident, occurring in the building in which his offices were situated. Entering the building in haste, he stepped through an elevator door, which had been carelessly left opened, without noticing that the car was not in place, and fell ten feet into the basement, sustaining a fracture of the base of the skull and several injuries. The immediate cause of death was meningitis, resulting from the fracture.

Mr. Bell was born in Edinburgh, Scotland, July 2, 1863, and received his education in the local schools and at the University of Edinburgh. He came to Canada when still a young man, in 1882, and was for some time employed in Montreal, and afterwards in the asbestos district around Black Lake in Quebec, spending most of his time at the old Allan mine. He was always of an adventurous disposition, and in 1884 he volunteered as a member of the Canadian contingent which served for several months in the Sudan. On the return of that contingent, he became a member of the Canadian volunteer force which was sent to Manitoba to repress the Rielé rebellion in 1885. In the following year he became assistant editor of the *Canadian Mining Review*, which had been established for some time, and a few years later became proprietor of that journal, which he continued to edit and publish up to the time of his death. As editor of the *Review*, Mr. Bell traveled widely and came in touch with mining men and mining enterprises in every part of the Dominion, so that few men were better known than he. Editorially he was always noted for his independence and his decided views, and he never hesitated to attack what he considered wrong-doing or dishonesty, on the part of individuals, companies or government departments. At the same time he was a strong advocate of any enterprise looking toward the development of the mining resources of Canada.

Naturally Mr. Bell took a lively interest in all attempts to organize the mining men of the Dominion and to bring them into contact with each other. He was the first secretary of the old Mica Association, which afterwards developed into the Mining Association of Quebec; he was also connected with the Nova Scotia Mining Association and was chosen honorary secretary of that body. When the Ontario Mining Association was formed, he was chosen secretary of that body also. When the first attempt was made to join the different provincial associations in the Canadian Federation of Mining Engineers, he was made the secretary, and when the Federation went out of existence and the present Canadian Mining Institute was finally organized, the choice of Mr. Bell as secretary was foreordained and unquestioned, and he had been unanimously re-elected to the office up to the present time. As secretary, Mr. Bell was the life of the Institute, paying constant attention to its affairs and keeping in touch with all the members. It will be extremely difficult to find another man who can take up the work with the same entire devotion and success.

Last summer Mr. Bell was appointed by the Dominion government, with Judge Britton, on the commission to examine into the so-called Treadgold concession in the Yukon. In this capacity he visited the mines of the Yukon territory, spending nearly the whole season there, and on his return to Ottawa commenced the preparation of the report. The commission took a large quantity of testimony, and it is understood that this evidence has been digested and the report practically completed, so that his death will probably not interfere with the completion of the commission work.

"B. T. A.," as he was familiarly known known to his numerous friends, will be widely regretted, and it will be indeed difficult to find anyone who can take up and carry on the special work for which he was so peculiarly fitted and which he did so well.

B. T. A. BELL.

EXPLOSION OF FIRE-DAMP DUE TO ROTTEN TIMBERS.

Gas explosions in metalliferous mines while rare, and more rarely of a serious nature, yet deserve attention. J. R. Jaquet, chief inspector of mines in New South Wales, in a recent report, gives some interesting details of an explosion that severely burned three miners in the Refrom shaft workings of the D'Arcy Wentworth mines, at Lucknow, on December 11, 1903.

A level was being driven at the back of the 300-ft. level, upon the main fissure, which occurs about the line of contact between serpentine and augite-andesite, locally termed diorite. The level was proceeding in the direction of an old winze, which was sunk from the 170-ft. level about 22 years ago. This winze was full of water, and contained some old timbers which had probably rotted away. In this decaying timber we have a possible source of light carburetted hydrogen—the fire-damp of the coal miner. No correct plans of the old workings were available.

When the drive had reached the vicinity of the old workings, drill-holes were kept in advance as a measure of precaution. One of these holes encountered a heavy flow of water which issued at a considerable pressure, and without doubt came from the old workings. Boring had to be discontinued because the pressure was sufficient to push the drills from the hole. Three days later, the pressure having fallen considerably, work was again started, and another drill-hole facilitated the escape of the water. Two miners, who left the face at 11.30 p. m., on December 10, stated that the water issuing from the bore-hole was quite clear, but had a faint and somewhat unpleasant odor, which they described as that of "old rotten wood and stagnant water."

Two other miners started to work with lighted candles at 8.30 a. m., on December 11. When the one in advance reached a point about 90 ft. from the end of the level there was a slight flicker, followed by a great bluish flame and a loud roaring noise. He dropped to the floor of the drive, and has no clear recollection of how he managed to crawl out. Both men were very severely burnt about the face and arms. The level was not again entered until the morning of December 15, when the scene of the disaster was inspected by Mr. Jaquet, the mine manager and others. They carried electric safety lamps, and so could not determine the composition of the air, but Mr. Jaquet thinks that no further accumulation of explosive gas had taken place. The water issuing from the bore-hole was clear and free from smell.

Mr. Jaquet concludes that the inflammable gas consisted essentially of carburetted hydrogen, produced during the rotting of the old timbers under water; that it accumulated under pressure in cavities either in the backs or along the side of the old workings, and was carried by the flowing water through the bore-hole into the intermediate level. Here, with air, it formed an explosive mixture, and ignited when brought in contact with the naked lights carried by the miners. The fact that the men were able to crawl back to the winze, and were not overcome by after-damp, seems to indicate that the explosive gases were not present in large quantities. The accident was unforeseen, and neither the mine manager nor the men were to blame.

It has been suggested that the inflammable gas issued from the country rock or lode, but no gas was encountered until the old workings were penetrated by the bore-hole, and moreover the country rock—serpentine and andesite—is absolutely devoid of carbon. Several cases have been recorded where explosive gases were encountered in metalliferous mines, and in some instances the rocks did not contain either bituminous or carbonaceous material. Le Neve Foster mentions an explosion at the Ding Dong mine, Cornwall, which occurred while re-opening an old level that had been for a long time under water. Professor Foster says that the gas seems to have been produced during the decomposition of the timber forming the sets. Fire-damp has also been encountered in old alluvial mines in Victoria.

The Lucknow mines are well ventilated, and Mr. Jaquet does not anticipate any further explosions, but he is of opinion that in this, and in all other mines in the State, special precautions should be taken when holing through from 'dead-ends' into old workings, in order to prevent the recurrence of similar accidents.

The element selenium was discovered by Berzelius in 1817. It is obtained principally from chamber-deposits in sulphuric acid manufacture.

DISCUSSION.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the ENGINEERING AND MINING JOURNAL.

PYRITE SMELTING.

The Editor:

Sir.—The term 'raw smelting' certainly defines itself and covers a great variety of ores, while 'pyrite' smelting has some distinctive features, and is more restricted in its application, so that the latter term can hardly be avoided.

When the ore treated has sufficient iron sulphide to become a decided factor in replacing carbonaceous fuel by the rapid oxidation of these elements in the blast furnace, thereby generating enough heat to do away with all, or a large part, of the carbonaceous fuel which would be necessary in the absence of these elements in excess of the amount required for the composition of matte showing the required concentration, pyrite smelting—as, possibly, the most distinct process—merges into smelting for matte without any great excess of sulphur and iron to be used as fuel, and thence into copper smelting, with so little sulphur present that it does not need to be considered as a factor in the running of the furnace or the composition of the product. I believe that the questions under consideration apply more nearly to pyrite smelting.

1. *What types of ore are suited to the process?*—Iron sulphide ores—the purer the better—combined with silicious ores; and if both are free from fines the conditions are ideal, especially if the charge is free from zinc sulphide. Under these conditions most of the claims made by the most enthusiastic advocates of pyrite smelting could be verified, but, unfortunately, all these favorable conditions seldom exist in any one locality, and the question arises: What percentage of fines and zinc sulphide make the ore unsuitable? Or, in other words: At what point would some other method, or *combination* of methods be competitive? I think that each separate smelting proposition has to be figured out from existing local conditions, such as the physical character of the ore, the cost of coke and fluxes, etc. Ores containing lead are not suitable for various commercial reasons, though this element does not interfere with the process in other respects.

2. *Is hot blast advisable?*—Every metallurgist should be guided by local conditions as to the advantage to him of a heated blast from a commercial standpoint. Metallurgically I believe it is always an advantage; but the question of getting a heated blast at a cost showing any additional profit over the use of the necessary amount of coke, at Utah and Colorado prices, has never been satisfactorily demonstrated to me, either by my own experience or that of others. The conditions affecting the comparative cost are the amount of fines and zinc sulphide in the charge, together with the price of coke.

3. *To what extent can fuel be eliminated?*—With a coarse charge, together with other true pyritic qualifications as to sulphur and iron, coke can be eliminated in proportion to the absence of fines and zinc sulphide, down to the intermittent use of two or three per cent.

4. *What amount of copper is required for the collection of the precious metals?*—In the absence of zinc sulphide a fairly satisfactory recovery of the precious metals can be made in an iron matte without copper, but the beneficial effect of even 0.5 per cent copper in the charge will be recognized; and if the charge contains a considerable amount of zinc sulphide, 1.5 to 2 per cent copper becomes necessary for a good separation, as a reasonable difference in the specific gravity between the matte and slag must be maintained.

5. *What percentage of lime is necessary to a clean slag?*—The amount of lime necessary is governed by the amount of available iron for the silica in the charge. When the iron is sufficient to satisfy both the matte requirements and the silica, very little lime is necessary, and may be cut down to six or eight per cent. In the case of insufficient iron, lime can be used as a base with which to combine the silica, to a considerable extent. I find that under my present conditions here the following composition of slag works well in every respect:

FeO	CaO	SiO_2	Ag	Cu
28	18	44	0.24 oz.	0.22 per cent.

6. *What percentage of zinc in the charge can be treated profitably?*—This element, in the form of sulphide, is an unmitigated nuisance. Its bad effects are numerous, and will be noted in the tonnage, recovery, and product; difficulties start with as little as three per cent in the charge, and increase quite in proportion until 12 per cent is reached, when the bad effects become serious, scaffolding the furnace shaft and forming accretions at the bottom of the furnace, sump and fore-hearth. The accumulation on the bottom of the furnace continues, if not corrected, until the tuyeres are slagged, at which point the furnace is likely to go out of business for a few days. If taken in time and the zinc in the charge reduced, with the addition of scrap iron, the furnace can generally be nursed into good condition again.

Zinc requires additional fuel and iron, reduces the tonnage treated, causes volatilization of silver, both in the furnaces and converters (if blistered copper is the final product), increases the specific gravity of the slag and decreases that of the matte, thereby making the separation less perfect, and reduces the value of the matte, whether sold, re-treated, or converted, and will show a very marked increase in silver losses in the slag.

7. *What is the degree of desulphurization attainable?*—Under conditions which warrant the choice of this process the smelting is rapid and the elimination of sulphur is from 60 to 70 per cent, with a concentration of 6 or 7 into 1. A much higher degree of desulphurization could be attained, but it would be at the expense of tonnage, either by slower driving, or a more silicious charge. In either case, the tonnage would be less.

8. *What are the possibilities as to capacity of furnace?*—The capacity of a furnace means the number of tons of *ore* put through in 24 hours, and the possibilities in this direction are governed:

First, by the amount of fluxes necessary to the ore charge.

Second, by the percentage of fines in the charge.

Third, by the amount of zinc sulphide present in the charge; assuming that other conditions are comparative.

I believe that the limit, as regards hearth area and volume and pressure of blast, have been reached, and that new records will depend upon the character of the charge.

9. *What are the limitations of the process?*—Competitive processes, or combination of methods, showing greater profits, governed to a great extent by fines, zinc sulphide and cost of coke.

10. *What is the relative economy as compared with rival processes?*—Less expensive construction of plant, less handling of material, less fuel required. Absence of roasting, either in mechanical roasters, which require crushing and rolling of the ore, or heap roasting, with its attendant handling and loss; and fuel used in either case. Large tonnage and rapidity of work, which means less operating cost per ton of ore. The resulting slags can be very silicious, if necessary, up to 46 per cent, without greatly retarding the speed of the furnace, and are comparatively clean. The sulphur excess in the charge is naturally a safeguard in taking care of the copper, preventing the formation of oxides which might enrich the slag.

In conclusion, I wish to confirm the experience of other operators in regard to the delicacy of the process. The care and continual watchfulness increase as the carbonaceous fuel is decreased, and any stop at all affects the furnace for hours, and long campaigns are the exception.

W. H. NUTTING.

Bingham Junction, Utah, Feb. 28, 1904.

MINING IN RHODESIA.

The Editor:

Sir.—In your issue of December 10, 1903 (Vol. LXXVI, pp. 885-888) appears a very interesting and timely article on 'Gold Mining in Rhodesia,' by Mr. F. C. Roberts. It has an especial interest to me, for much of the data upon which the article is based has been furnished by a mine in which I am a shareholder, and of which the earlier development was carried on under my direction. Mr. Roberts was for a short time the mine manager, and later succeeded me as engineer.

Having spent nearly six years in Rhodesia, and having had exceptional opportunities of studying a large portion of that section of it known as Matabeleland—and it is to this section that Mr. Roberts more particularly, though not exclusively, refers—I would like the opportunity of offering a little friendly criticism on the article referred to. In my remarks I shall keep in mind the fact that an article which attempts in such small compass to treat of every feature of the gold-mining industry in Rhodesia must necessarily be incomplete.

The first statement upon which I would comment is: "In but one instance in the whole of Rhodesia has it been found advantageous to attack the ore-bodies and veins through adits." If this means that only one adit has been driven in Rhodesia it is very wide of the truth. I have seen adits on no fewer than seven different properties, and there others in the country; and I have every reason to believe that it will be found advantageous to win the ore from more than one of these.

Physical and Geological Features.—While it is a fact that "few really high mountain ranges traverse the country" it must be borne in mind that the general elevation is high, Bulawayo being 4,469 ft. above sea-level, and the summits of the highest hills reach an elevation of nearly 6,000 ft. Viewed from the plains and valleys the hills certainly do not appear high.

I had not observed the feature of "conical hills" in the granite belts, though I have traversed the country from its eastern boundary as far west as 27° 20′ E. long., and from its southern boundary as far north as 17° 40′ S. lat. The weathering of the granite hills in Rhodesia is the same as in other parts of the world, the prevailing types being either domes or boulder-strewn ridges with castellated escarpments. The conical hills (more correctly, pyramidal) are rather characteristic of the schistose areas.

It is true that "no geological survey has yet been made in Rhodesia" (though in no other country in the world is one more needed), and the several so-called "geological" maps of it which have been published have no scientific value whatever; but the "generalised description" of the geology given by Mr. Roberts is not very accurate, if not actually misleading. Enough is known of the subject to afford a better account than has been presented by Mr. Roberts; but of course it must be understood that he writes as a miner rather than as a geologist.

We are told that "By far the greater portion of the country consists of granite rocks, in wide belts, having a strike somewhat west of north and east of south." Even if in the term "granite rocks" we include typical granite, syenite, gneiss, and all granitoid varieties of rocks, I think Mr. Roberts' estimate of the extent of their occurrence is an excessively high one. I should say that very much less than one-half the total area of the country is granitic. The strike of these rocks is not accurately given, indeed no general strike prevails. Some of the larger granite belts have a trend almost due east-and-west, some smaller ones trend north-and-south; and some in fact trend in almost every direction.

While it is true that "the gold belts embrace the areas characterized by slates and schists," it is also true that some of the gold-mines are well within the granite areas. This is the case of the mine figured on p. 885, the immediate country-rock being granitoid, and it lies on the northern side of an extensive granite belt, trending nearly east-and-west, and bounded on the north and south by hills of metamorphic rocks.

We are told that "In the valleys, or small gulches of the hill country, the alluvium is of very limited extent, suggesting a lack of those extreme climatic conditions necessary to produce rapid erosion." But even if it were true —which I take leave to doubt—that the alluvium is so limited, surely the fact suggests something else than is stated. Do not the torrential summer rains account for the removal of the alluvium from the hill country? In the broad valleys the thickness of the alluvium is often very great, and every one who has visited the country is familiar with the deep drifts by which the river-fords are usually approached.

The description of the quartz veins might have been extended by a reference to a number of large ones which are not only wide, but may be traced almost continuously for several miles. Reference is made to the auriferous diorite of the Ayrshire mine, but, as you point out in a footnote, this has been previously described in the JOURNAL at greater length. I am greatly interested in Mr. Roberts' account of his discovery of an auriferous hornblende porphyrite, and I wonder if it occurs in a part of the country which I visited.

Ancient Workings.—Some of those who have devoted much time to the study of the question of the ancient race, or races, who formerly exploited the Rhodesian gold-fields will hardly feel flattered on being told that "no satisfactory explanation has been advanced touching their (the ancients') identity"; notwithstanding the ethnographical investigators have written volumes on the subject. But I am prepared to go all the way with Mr. Roberts when he speaks of the estimates that have been made of the gold recovered by the ancients as "hypothetic"—I think they are ridiculous; but I cannot believe with him that 10 dwt. of gold per ton of ore was the minimum value of that treated by the ancients—I think they must have, in many cases, treated ore as low as, if not lower than, 5 dwt. of gold to the ton.

Financial Considerations.—We have here a brief but fair account of the financing of Rhodesian mines, many of which, it may be emphasized, are very largely over-capitalized. In referring to the Mineral Ordinance Mr. Roberts omitted to mention that a new one has been drawn up and is expected soon to be promulgated, and from which the objectionable feature of the "law of the apex" is to be eliminated. Mr. John Hays Hammond has been largely blamed—I know not with what truth—for the adoption of this indefensible feature of the original ordinance. But as the new ordinance can hardly be made retrospective, it is likely that the lawyers may yet reap a golden harvest from the obnoxious law.

Assay Plans.—Mr. Roberts' description of these as in use in Rhodesia is correct as far as it goes; and it is satisfactory to learn that while slight differences of method of constructing the plans may be found in the several mines, "the fundamental principles are adhered to." This general uniformity of principle may be largely attributable to Mr. E. H. Garthwaite, the government engineer, who has made a special study of sampling and mine-valuation, and has been in a position to impress his views on the companies' engineers. The assay diagram shown by Mr. Roberts on p. 886 seems to me to have been unfortunately selected and inaccurately described. I do not think the use of graphic diagrams has yet become general in Rhodesia; nor is the one illustrated a 'stoping diagram.' I recognized it at once as a simple assay-plan of a prospecting level which was opened up under my direction in 1897-98. The suggestion that assay values should be given in shillings instead of Troy pennyweights is most important, and it is to be hoped that this system may be adopted in the near future.

Development Work.—It is difficult to offer any criticism of the figures presented by Mr. Roberts, as they are incomplete and some minor errors appear. It would seem that in the period under review 2,677 ft. of development was accomplished, and 38,100 tons of ore were won and milled. Now, if the shafts, levels and winzes averaged 4 by 6 ft. in cross-section, and allowing 14 cu. ft. of quartz to the ton, there would only be 4,589 tons obtained from the footage given. Perhaps the decimal point in the middle column of figures is misplaced one figure to the left, in which case the tons milled would figure out about 3,810, and the total cost per ton milled would be $17.93 instead of $1.79, which would be absurd. What is probably the fact is the omission to mention the area stoped. But 'stopage' is not 'footage.' If no stoping is included in the cost the price given per foot, $26.50 (it figures out $25.51) is excessive, even for Rhodesia. On the other hand, if the total cost of mining ore is only $1.79 per ton the figure seems too low. Putting the cost of milling—which is not given—at one-half that of mining, which is fair, the total cost per ton would only be $2.68, a figure that is too low for Mr. Roberts or any one else to reach in Rhodesia.

Then the two items "Compressors and rock-drills" and "Rock-drills and sharpening" together amount to $21,979, out of a total of $68,300, or over 32 per cent. And here I might say that this seems to confirm my expressed opinion that at the mine in question, owing to the scarcity and high cost of fuel, the installation of a compressor plant was not advisable until cheaper fuel could be obtained. Possibly some part, or the whole, of the cost of the compressor plant is included in the item $16,399; if so a portion at least of the cost of all the other plant should be included as well. It is not worth while to discuss these figures further until additional light is thrown upon them by their author.

Milling.—We are informed that "The introduction of heavy stamps with the object of securing a large stamp-duty has now reached its practical limits, that is, at 1,456 lb." Does not this weight exceed the limit? I fear so, and the fear is partly inspired by what Mr. Roberts says further on the subject. When I drew up the first specifications for the mill under review I called for stamps of 1,050 lb. falling weight, but later, on consulting with some of the leading engineers at Johannesburg and Bulawayo, I altered the specification to 1,250 lb. But the mill was ultimately erected under Mr. Roberts' direction and, I presume, according to his specifications.

Cyanidation.—Mr. Roberts' remarks on this subject are interesting and important. It may be questioned, as he points out, whether it is advisable to install a cyanide plant in Rhodesia so long as the ore continues free-milling. There would be no question of its advisability whenever the sulphide ore is reached. It is all a question of testing for each particular mine.

Perhaps I feel an exceptional interest in Mr. Roberts' article, dealing as it does with a mine of which the first development was done under my direction; but it should have a general interest as well, and it is only to be regretted that it was not longer and more detailed.

WALLACE BROAD.

Shanghai, Jan. 25, 1904.

CYANIDATION OF SANDS.

The Editor:

Sir.—Since the appearance of the courteous letter of Mr. Herbert A. Megraw, in your issue of February 18, I have, through the kindness of the Blaisdell Company, received a copy of their catalogue and also the full text of the paper of Messrs. Butters and Crank, of which an extract was given in your issue of December 5 and on which I made some comment in the issue of December 31; and I now beg to be allowed to reply briefly to Mr. Megraw.

At the outset I must confess that ignorance of the science and art of cyaniding puts me at a disadvantage from the start, and it is not in the least from the standpoint of cyanidation,

but only from the general point of view of an engineering problem that I can deal with it. It is unfortunate for me that not a word, except in the most indirect way, is said in the paper of Messrs. Butters and Crank in regard to the way the sand gets *into* the collecting vats and as to whether the sand is separated from the slime *previous* to its admission to the tanks (as the allusion to classifiers seems to indicate) or whether (as Mr. Megraw's letter seems to imply) the separation is made in the filling of the tank, I shall therefore deal both with the assumption that the separation is *not* made previous to the admission of the water-borne material to the vat and that it *is* so made.

If the separation is not made previous to removal of the sand from the water, it would simply be necessary to put, in the trough carrying the material, an enlargement of the proper shape and of a size adapted to give the required reduction in velocity to let the desired material settle out; and place a sand-shoveler in this enlargement. This would remove, as fast as deposited, the material whose size and specific gravity were sufficient to withdraw it from the current and would permit of the disposition of it as required, direct and at once. The water carrying the finer material would pass on, and by the use of the shoveler, working in a section of trough of still longer cross-section, the finer material could be removed if desired. In the cyanide plant described, this first shoveler would take the place of the two collecting vats as well as of the excavator and the sand from it would drop directly onto a belt-conveyor which would take it to the centrifugal distributor.

In regard to its dryness and looseness there would, I think, be nothing further to be desired, as the remarkable feature of the machine, apart from its simplicity, is the dryness of the material delivered by it, while the conditions for oxidation could not be better than those presented by the breaking up of the individual shovelfuls as they fall from the shovels. Mr. Megraw does not believe that the machine can deliver clean sand free from slime, etc., and to convince him I am sending him a sample of the sand from water which contains twice as much clay as it does sand, so that he may see for himself. I shall be glad to convince any one else who is willing to be convinced in the same way.

If the material has been classified before it is to be removed from the water, the problem is a little simpler; but not much. In that case it would only be necessary to put in a shoveler which should certainly be large enough to bring all the sand to rest and prevent any of it from being lost. A considerable range of adjustment in the quantity and size of material saved can be made in a machine of any given size by regulating the height of the waste or outflow gate, and thereby varying the cross-section of the stream under the shoveler.

With all due respect to Mr. Megraw and with free admission of my ignorance of cyaniding I must still maintain that, as far as anything so far stated goes, the homely and inexpensive sand-shoveler will do the work of the many times more expensive Blaisdell excavator and collecting vats. Did I not believe that the machine is capable of assisting and advancing mill-practice, within its field, I should not trespass so far upon your indulgence by my insistence upon the point.

J. E. JOHNSON, JR.

Longdale, Va., March 2, 1904.

THE MINERAL PRODUCTION OF CANADA IN 1903.

The preliminary statement of the mineral production of Canada in the year 1903 has just been issued, the work showing a promptness which deserves high commendation. The statement, which is prepared by the Section of Mines of the Geological Survey, under charge of Mr. Elfric Drew Ingall, is as follows:

SUMMARY OF THE MINERAL PRODUCTION OF CANADA.

Metallic.		Quantity.	Value.
Copper	Lb.	43,281,158	$5,728,261
Gold		.....	18,834,490
Iron ore (exports)	Tons	368,233	922,571
Pig iron from Canadian ore.	"	42,052	707,838
Lead	Lb.	18,000,000	762,660
Nickel	"	12,505,510	5,002,204
Silver	Oz.	3,182,000	1,700,779
Zinc	Lb.	900,000	48,600
Total metallic		.....	$33,707,403
Non-metallic.			
Actinolite	Tons	550	3,108
Arsenic	"	257	15,420
Asbestos	"	31,780	891,033
Asbestic	"	10,548	13,819
Chromite	"	3,383	33,830
Coal	"	7,996,634	15,957,946
Coke	"	544,132	1,663,725
Corundum	"	no returns	.....
Feldspar	"	13,228	18,066
Fire clay	"	2,317	2,505
Graphite	"	738	23,745
Grindstones	"	5,538	48,302
Gypsum	"	307,489	384,259
Limestone for flux	"	277,452	259,244
Manganese ore (exports).	"	135	1,889
Mica	"	.....	159,473
Mineral pigments—			
Baryta	Tons	1,163	3,931
Ochres	"	6,226	32,440
Mineral water		.....	100,000
Moulding sand	Tons	3,568	7,256
Natural gas		.....	168,900
Peat	Tons	1,100	3,300
Petroleum	Bbl.	461,336	922,672
Phosphate	Tons	1,329	8,214
Pyrites	"	33,530	126,133
Salt	"	53,537	334,088
Talc	"	688	2,064
Tripolite	"	835	16,700
Total non-metallic		.....	$21,202,062
Structural Materials and Clay Products.			
Cement, natural rock	Bbl.	92,252	$75,665
Cement, Portland	"	627,741	1,090,842
Granite		.....	150,000
Pottery		.....	200,000
Sands and gravels (expts.)	Tons	355,792	124,006
Sewer pipe		.....	317,970
Slate		.....	22,040
Terra cotta, pressed brick, etc.		.....	386,532
Building material, including bricks, building stone, lime, tiles, etc.		.....	5,650,000
Total structural materials and clay products		.....	$8,017,045
Estimated value of mineral products not returned		.....	300,000
Total, 1903		.....	$63,226,510

The tons used in this statement are short tons, of 2,000 lb. The average prices used in computing values of metals are: Silver, 53.45c.; copper, 13.235c.; nickel, 40c.; lead, 4.237c. The coke reported is all oven coke; gas coke is not included.

It is to be borne in mind that the only general and definite standard for valuing the varying and various products of the metal mining industries of the country is that herein adopted, viz., the final value of their metallic contents at the average market price for the year.

This reduces them to a common datum line for the purposes of this general table, and results in such uniformity of statement that the figures are reasonably comparable from year to year, in illustration of the fluctuation and the growth of the different industries.

The non-metallic minerals having a tangible use or value as individual minerals are put down at the average spot value for cash.

While this plan, of course, results in some discrepancies, it is adopted as the best attainable method for the purposes of this general statement, which is practically an advance presentation of the mineral industry as a whole.

The detailed presentation of the particulars of the various subordinate industries from other standpoints is reserved for the annual report of the Mines Section.

The total production of pig iron in Canada in 1903, from Canadian and imported ores amounted to 297,885 tons, valued at $3,742,710, of which it is estimated 42,052 tons, valued at $707,838, should be attributed to Canadian ore and 255,833 tons, valued at $3,034,872, to the ore imported.

The value of the total production reported for 18 years past has been as follows:

1886	$10,221,255	1895	$20,648,964
1887	11,321,331	1896	22,584,513
1888	12,518,894	1897	28,661,430
1889	14,013,913	1898	38,697,021
1890	16,763,353	1899	49,584,027
1891	18,976,616	1900	64,618,268
1892	16,628,417	1901	66,339,158
1893	20,035,082	1902	63,885,999
1894	19,931,158	1903	63,226,510

The remarkable increase in the period from 1898 to 1900, inclusive, was due to the gold discoveries in the Yukon.

The main feature presented by the mineral industry of Canada as a whole consists in the decrease in the grand total of production of a little over 1 per cent in comparison with the figures for 1902. A comparison of the items for the two years shows the reason for this falling off. The shrinkage in the production of the Yukon placer gold-fields accounts for $2,250,000 of the total diminution of over $2,500,000 in the gold output of the country. This is augmented by over $1,000,000 decrease in the values of the output credited to others of the metallic class, pig iron, silver, lead and nickel. To offset this the copper, iron-ore and zinc industries exhibit increases, aggregating nearly $1,500,000, leaving a minus amount of a little over $2,000,000, against the metallic class as a whole, equivalent to nearly 6 per cent.

Advances were shown in several of the non-metallic class, notably in coal and coke, limestone, mica, salt, cement, and in some of the clay products. The total growth in all the non-metallics showing increases, amounted to nearly $2,000,000, the advance in the coal and coke output accounting for over $1,600,000 of this. As against these non-metallic industries showing increases, decreases are exhibited in the values of the production in asbestos, natural gas, petroleum and a number of others, aggregating about $500,000, leaving a net gain in this class of somewhat under $1,500,000, or a little over 5 per cent to offset the above-mentioned falling off in the metallic class, the final difference in the grand totals for the two years amounting to nearly $660,000, or a proportional decrease of close on 1 per cent.

Decreases, both in quantities and values, have been the chief characteristic of the leading metallic industries, with the notable exceptions of copper and nickel. In the latter case, however, the considerable increase in the output has been more than offset by the lower valuation which has been given to the metal following the drop in the average market price for the year. The increase in the copper output was, on the other hand, considerably enhanced by the higher average market price of the metal. It is interesting to note also that with regard to pig iron, lead and silver, higher market prices modified the heavy falling away in these items. The whole of the group classed as metallic, shows a decrease of 5.8 per cent.

In the non-metallic class the more important contributors exhibit substantial increases in quantities, but lower prices reversed the effect

in the case of asbestos and lessened the advantage gained in the case of coal and cement, coke only showing a slight gain. In the grand totals of the non-metallic class the figures for structural materials and clay products show a slight increase of 1.5 per cent, all other non-metallics being credited with an advance of over 6.6 per cent.

The relative importance of the different mineral industries contributing to the grand total will be apparent from an inspection of the above table, in which the figures account for all but about five per cent of the aggregate. As usual, gold, together with coal and coke, constitute Canada's most valuable mineral assets, gold forming 29.8 and coal 27.9 per cent of the value of the whole mineral output of the country. To the metallic class as a whole must be credited 53.31 per cent of the mineral output, the structural material division contributing 13.15 per cent, and the other non-metallic products a little over one-third, or 33.53 per cent.

The per capita value of the total mineral products for 1903 was $11.29, as compared with $2.23 in 1886, the first year for which figures are available.

Gold.—A decrease of $2,500,000 is shown, of which $2,250,000 is to be ascribed to the decreased output from the Yukon district. The Yukon output for the year, $12,500,000, is based on the receipts of Canadian Yukon gold at the United States Mint at San Francisco and other receiving offices. The total from other districts was $6,584,490.

The contributors to the total, as formerly, were Nova Scotia, Quebec, Ontario, Saskatchewan, the Yukon Territory and British Columbia.

Silver.—Silver production, according to present indications, shows a considerable decrease, over a million ounces, compared with last year's output. Over 90 per cent. of the production is obtained from British Columbia.

Lead.—The production of lead in 1903 has been estimated at about 9,000 tons. The exports, according to customs returns, were 9,314 tons, valued at $426,466. The production is practically all the output of British Columbia mines, no return having been received from eastern Canada.

Copper.—The copper contained in ore, matte, etc., shipped from Canadian mines in 1903, was about 21,640 tons, an increase of 2,238 tons, or over 11.5 per cent, over the previous year's output. In Ontario and Quebec there was little change, perhaps a slight falling off, the increase being practically all in British Columbia. From the Sudbury district, Ontario, about 13,832 tons of high-grade matte were shipped, containing 3,576 tons of copper. In British Columbia shipments of ore from the Boundary district were approximately 625,000 tons in 1903, and from Rossland about 377,000 tons. For statistical purposes the copper is valued at the average price for the year of electrolytic copper in New York, viz., 13.235c. per lb. This is an increase on the average price for 1902 of nearly 14 per cent.

Nickel.—The following were the results of operations on the nickel-copper deposits in 1903:

	Tons.
Ore mined	136,033
Ore smelted	207,030
Matte shipped	13,832
Matte in stock at end of year	1,246
Copper contents of matte shipped	3,576
Nickel contents of matte shipped	6,258
Value of matte shipped	$2,686,469

According to customs returns exports of nickel were as follows: To Great Britain, 1,335,677; United States, 11,363,470; other countries, 80; total, 12,699,277 pounds.

Zinc.—About 1,000 tons of zinc ore, worth $10,500, were shipped to Swansea, Wales, from the Long Lake zinc mines in the county of Frontenac, Ont. No returns have been received of zinc production in British Columbia.

Iron.—Exports of iron ore were 368,233 tons, valued at $922,521. About 81,035 tons of iron ore from Canadian mines were charged to blast furnaces in Canada and valued at the furnace at about $247,229. In addition to the above Canadian ore, 485,911 tons of imported ore, valued at $823,147, were used in Canadian furnaces. The total quantity of pig iron manufactured from both Canadian and imported ores was 297,885 tons, of which 19,614 tons were made with charcoal as fuel and 278,271 tons with coke.

Arsenic.—The arsenic plant at Deloro, Ont., was worked for three months only, producing 257 tons of white arsenic, valued at $15,420. Exports of arsenic were 198 tons, valued at $10,583.

Coal and Coke.—An increased production is reported from all the provinces in which coal mining is being carried on. The Dominion Coal Company, the largest producing company in Nova Scotia, increased its output, notwithstanding the serious check cause by the fire in Dominion No. 1 colliery in March. The Nova Scotia Steel & Coal Company also shows very largely increased output from the Sydney mines. Considerable activity has been displayed in the operation of the mines in the Northwest Territories, especially on the eastern slope of the Rocky Mountains, in the district about Blairmore.

In British Columbia, the output of the Crows Nest Pass Coal Company exceeded that of 1902 by 49.8 per cent, and the company has made substantial progress in the development of their properties. On the coast the Western Fuel Company is actively operating and developing the properties formerly worked by the New Vancouver Coal Mining & Land Company. The Wellington Colliery Company has been opening up a seam of anthracite coal, from which it is expected shipments will soon be made.

Corundum.—Returns have not yet been received of production of corundum, but railway shipments at Barry's Bay are reported at 1,090 tons, which may, however, include corundrum ore as well as grain corundrum.

Asbestos.—The production of asbestos, divided into crude and mill stock, was as follows: Crude, 3,134 tons, valued at $361,867; mill stock, 27,995 tons, valued at $554,021; total, 31,129 tons. Exports of asbestos, according to Customs returns, were 31,780 tons, valued at $891,033. The product was all obtained from the eastern townships, Quebec.

Cement.—The production of natural rock cement is at present small in comparison with the output of portland, and the sales in 1903 were less by 35,679 bbl. than in 1902. Detailed statistics for 1903 were as follows, in barrels:

	Natural.	Portland.
Cement sold	29,252	627,741
Cement manufactured	96,152	714,136
Stock Jan. 1, 1903	23,000	41,991
Stock Dec. 31, 1903	26,000	128,386
Wages paid	$29,550	$400,000

The imports of portland cement in 1903 were 135,394 tons, valued at $1,060,696. This is equivalent to about 773,678 bbl. of 350 lb. each.

Exports.—The following table shows the chief items of minerals exported during the year:

Product.	Quantity.	Value.
Arsenic ..... Lb.	395,573	$10,583
Asbestos ..... Tons	31,780	891,033
Coal ..... "	1,954,629	5,219,860
Gold in all forms	.....	17,566,540
Copper, fine, in ore, etc.... Lb.	37,039,175	3,702,368
Copper, black or coarse, etc. "	203,701	25,226
Lead in ore, etc..... "	18,624,303	426,466
Nickel in ore, matte, etc... "	12,699,227	1,116,099
Platinum in ore, concentrates, etc. ..... Oz.	283	304
Silver in ore, etc..... "	3,360,192	1,989,474
Mica ..... Lb.	956,244	196,020
Iron ore..... Tons	368,233	922,571
Graphite, crude ..... Cwt.	8,235	26,230
Pyrites ..... Tons	21,067	59,604

The gold exported was chiefly in the form of gold dust, nuggets and the like, or contained in ores.

GAS, COKE, TAR AND AMMONIA PRODUCTS IN 1902.

In making its annual canvass of the coal-mining and coke-making industries for 1902, the United States Geological Survey has extended its inquiries in order to cover all plants producing gas and coke from coal and covering tar and ammonia. The final report, by Edward W. Parker, will appear in 'The Mineral Resources' for 1902, and we give below an abstract of some of the more important data in advance of its publication.

In 1902 the returns from 533 companies, including the operations of 1,663 by-product coke-ovens, show that 5,015,511 tons of coal were carbonized, which yielded 30,764,625,332 cub. ft. of gas. Of this product 29,079,073,555 cub. ft. were sold, leaving 1,685,551,777 cub. ft. lost or unaccounted for. About 2,000,000 tons of the total coal carbonized were used in by-product ovens.

The aggregate value of all the products obtained from the distillation of coal in gas works or retort ovens in 1902 was $43,869,440. About two-thirds of this amount, or $29,342,881, was represented by the value of the gas produced. The value of the coke produced was $11,267,608, while the tar was worth, at the works, $1,873,966. Most of the ammonia produced was sold in the form of ammoniacal liquor. The total quantity sold was 49,490,609 gal., and was worth, at the works, $1,065,300. In addition to this there was an actual production of 11,276,502 lb. of sulphate, which sold for $319,685.

Comparatively little progress in the manufacture of chemical products from coal-tar has been made in this country. Although we are producing over 50,000,000 gal. of coal-tar annually, the principal uses made of it are for the manufacture of roofing paper, the creosoting of lumber, and for the preparation of street-paving material. At the same time we are importing millions of dollars' worth of chemicals obtained from coal-tar as a raw material. The coal-tar produced in this country in 1902 was worth at first hand $1,873,966. In the fiscal year ended June 30, 1902, the coal-tar products imported into the United States were worth, at points of shipment, $7,494,340. Including duty, freight, and other costs, their value in the wholesale markets of this country probably amounted to about $12,000,000 in all.

Krennerite is a telluride of gold, approximating calaverite as regards composition, but differing from the latter in possessing a perfect cleavage. It was named after Professor J. A. Krenner, of Buda-Pesth.

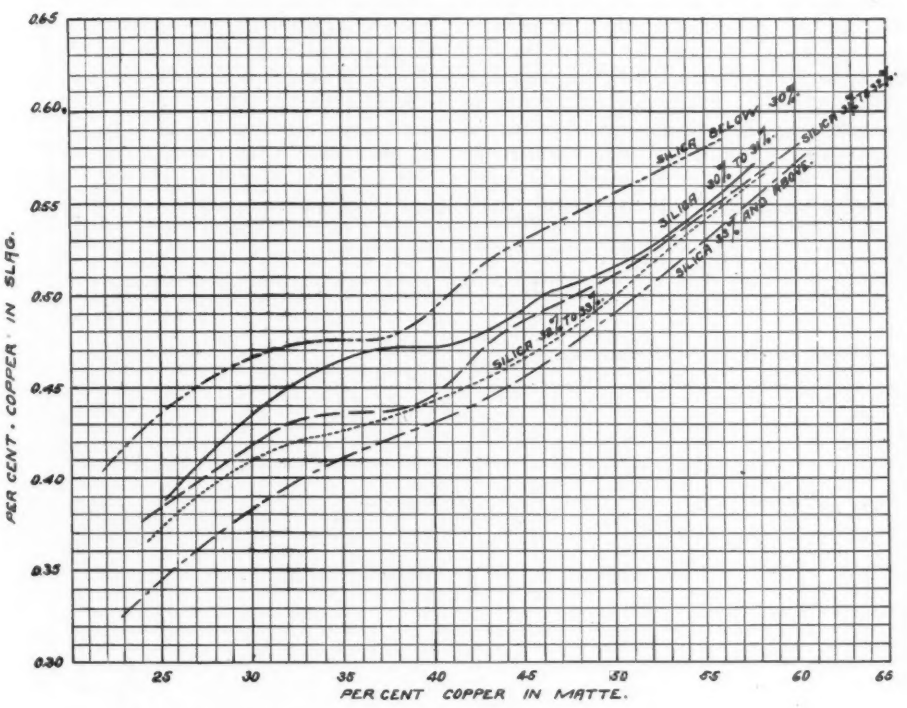
COPPER LOSSES IN BLAST FURNACE SLAGS.

By William A. Heywood.

With a view to presenting in graphic form the ratio of copper in blast furnace slags to the copper contained in the matte produced at the same time, 2,590 assays, representing all the work of two furnaces for a period of two and one-half years, were plotted with the results shown in the accompanying diagrams. The first intention was to plot the slags to show the copper contents only, but it soon became apparent that the amount of silica in the slag had a great influence on the copper contents, the more basic irony slags carrying away much more copper than the more silicious slags. As the ore smelted was heap-roasted pyrrhotite containing only from 10 to 20 per cent of silica, and the remaining silica had to be added in the form of barren quartz, it was an important question to determine what quantity of silica was the most economical, considering the rate of smelting and the cost of converting matte of different grades as well as the copper losses in the blast furnace slags.

An impression exists at many copper smelters that, a furnace producing a very irony slag runs much faster than one running on a more silicious mixture. Within the limits of our practice this has not been confirmed. Taking our largest runs of over 600 tons per furnace-day as many have occurred when the furnace was producing a slag with 32 to 34 per cent silica as when the slags contained from 28 to 32 per cent silica.

Each assay represents an average of 12 hours slag from one furnace. The samples were taken hourly, chilled, and the copper determined on a five gram sample by cyanide after precipitating the copper with aluminum. Once a week composite samples were made up from the daily samples from each furnace and assayed by electrolysis. Part of the weekly composite samples were sent to New York regularly, for check assay. The electrolytic determination is usually 0.02 per cent higher in copper than the cyanide assay. The insoluble in the slag was taken as silica, although the absolute silica determined by fusion is 1.5 to 2 per cent lower.



NO. 1. SLAG CURVES REPRESENTING 2,500 ANALYSES. TENNESSEE COPPER COMPANY, JAN. 25, 1904.

The following is a complete analysis of a month's average slag:

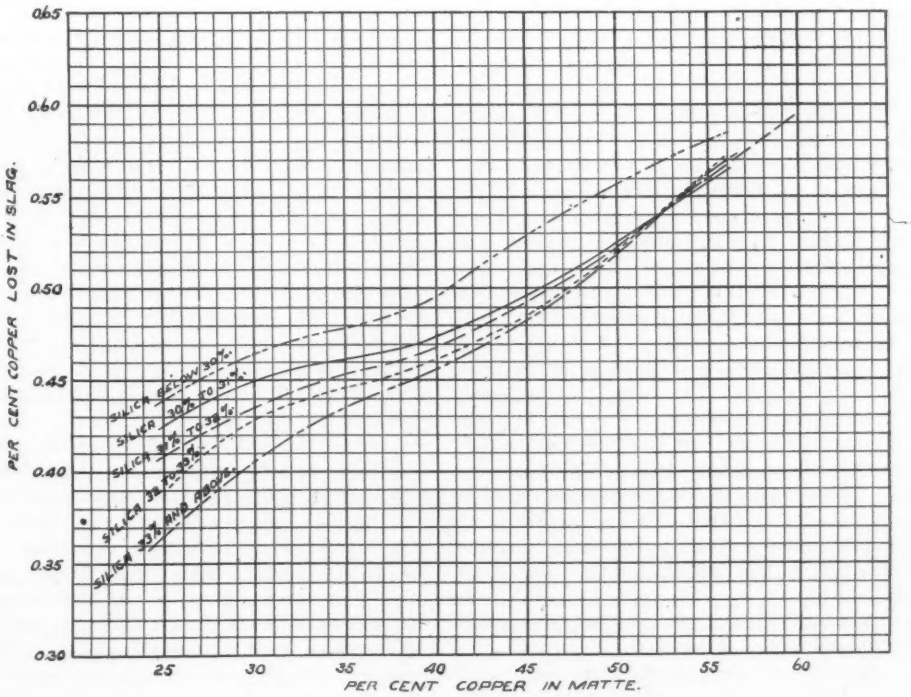
SiO_2	31.04	per cent.
FeO	51.40	" "
Al_2O_3	4.84	" "
CaO	6.30	" "
MgO	1.37	" "
S	1.36	" "
Zn	2.01	" "
Mn	0.51	" "
Cu	0.45	" "

In Fig. 1 the assays of the different slags and mattes were first plotted separately for the different silica percentages. The curves were then traced on one sheet.

In Fig. 2 these curves were adjusted, and the actual copper losses are shown by allowing for the increased quantity of slag made by the additional quartz necessary to produce the more silicious slag.

FIRE-PROOFING WITH SULPHATE OF ALUMINUM.—Experiments made by Joseph L. Ferrell, a civil engineer, of Philadelphia, Pa., show that wood or other material, saturated by pressure with sulphate of aluminum, will resist the heat of a Bunsen burner 2,460° F.

PHOSPHATE DEPOSITS IN SOUTH AUSTRALIA.—The occurrence of phosphate deposits on York Peninsula, according to the government geologist, is similar to those at Clinton, Bright and Belvidere. Samples of the boulders and lumps of phosphate rock taken from trenches made about 300 ft apart, analyzed from 70.07 to 82.95 per cent tricalcic phosphate. Analyses of specimens consisting of basic phosphate of alumina, with limestones, clay, etc., returned from 13 to 22.4 per cent phosphoric acid. The Cambrian limestone is exposed in several detached areas as far south as Curramulka, and it is in the vicinity of these outcrops that phosphate rock deposits are most likely to be found.



NO. 2. COPPER LOSS CURVES FOR DIFFERENT SLAGS.

Based on adjusted slag curves and assumption that total amount of slag increases in direct ratio to silica added in form of quartz, as follows:

30% Silica = 10,000 slag. 31% Silica = 10,145 slag.
32% Silica = 10,290 slag. 33% Silica = 10,447 slag.
34% Silica = 10,606 slag.

THE FRAMING OF RECTANGULAR SHAFT SETS.

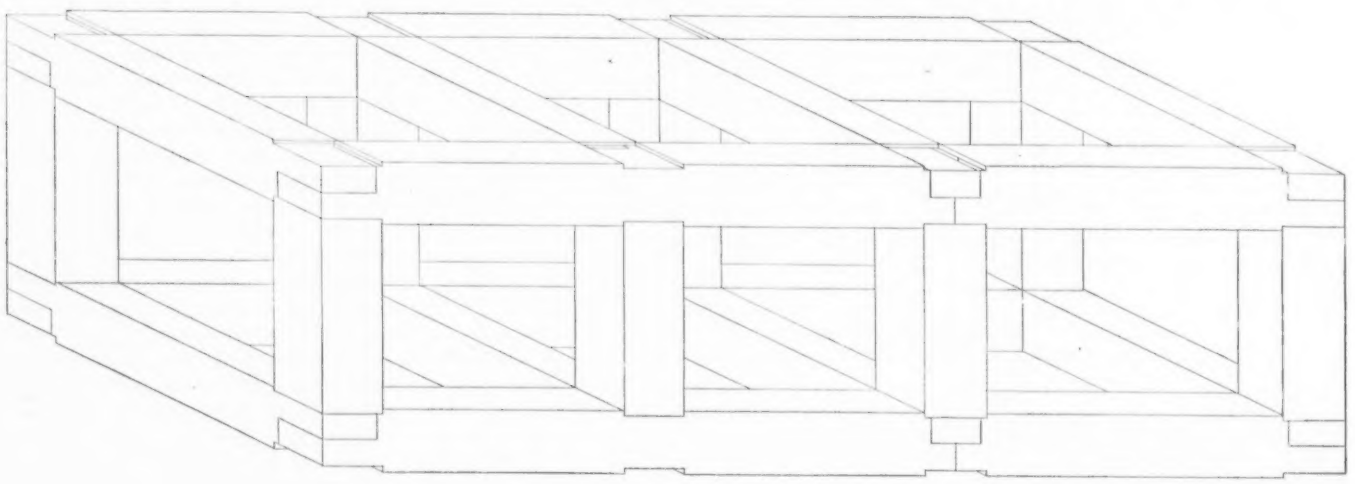
By WILBUR E. SANDERS.

The support most frequently employed for preserving the integrity of vertical and inclined shafts consists of a rectangular frame of timber, the parts of which, proportioned to any required dimensions, are so fitted together at the joints as to form a connection that will weaken the timbers forming the 'set' or frame in the least possible degree. Many methods of framing the joints have been employed and many forms of joints used, but those described below are now almost universally accepted as affording the greatest possible strength while being at the same time of comparatively simple construction. Their present general use may be said to represent a survival of the fittest. (See Plate I.)

The connecting joints between the different timbers that are known as 'plates.' While all of the plates of a set are properly wall-plates, yet there is a distinction usually made in that the longer pair, those paralleling the greater axis of the shaft, are named 'wall-plates' in contra-distinction to the shorter pair which are in line with, or parallel to, the shorter axis of the shaft, and which are known as end-plates, or briefly 'ends.' This designation is now generally applied to the plates of both the vertical and inclined shafts, although it is probable that the name originated in connection with the timbering of the latter, in which the longer timbers of the set, the one supporting the hanging-wall and that supporting the foot-wall of the working, naturally were called wall-plates, and this significance of the term was finally extended to comprehend the similar longer plates of vertical shafts as well.

The above are parts belonging to the simple rectangular set of the single or one-compartment shaft, but the cross-sectional area of larger shafts is usually divided for purposes of traffic, ventilation and the accommodation of mining appliances, into two or more compartments separated from one another by divisional girts or 'centers.' In sinking through firm ground the bottom of the shaft is frequently excavated for a considerable distance ahead of, or below, the timber-supports in order that ample space may be afforded for the placing of the shaft-sets and to remove the timbers thereof from any possibility of being shattered or displaced by heavy blasts beneath. This allows the use of undivided full-length wall-plates. In some ground, however, this is not permissible and the material surrounding the shaft, through which it is being driven, may be of such texture as will make it imperative that the timbering shall closely follow. if indeed it does not crowd, the excavation of the working. Under such conditions the use of full-length wall-plates is impossible and therefore it is necessary to divide or 'splice' such timbers that they may be brought into position. The girts act as distance-pieces between the plates in order to preserve the width of the shaft. At the points of division of the wall-plates, at the splices, the girts are known as 'splice-centers,' while those used to separate the compartments, at such other points of the wall-plates as are not spliced but solid, receive the simple designation of 'centers.'

PLATE 1
FRAME OF RECTANGULAR SHAFT SET.
ASSEMBLED.



timbers that are assembled to form the shaft-set are made up of various shapes of the tenon and mortise, the gain and the miter, used either singly or in combination, which are the basis of all joint-framing, however much they may vary from their simple forms when employed as shoulders, squared or beveled, and all other contrivances whatsoever for bringing together from two or more directions the parts of the set and properly connecting them at such points. In general it may be assumed that the pressure-thrust is directed from without inward toward the center of the shaft, and it is for the purpose of opposing or resisting this pressure that the shaft-set is designed. This hypothesis, however, is true only in part; for, through causes that are sometimes known, but often are unknown, the action of this inward pressure becomes deflected from a normal direction to one that bears upon the frame at a divergent angle, and this is especially true with regard to inclined shafts in certain formations. In such cases the remedy is usually applied whenever it may be necessary, subsequent to the timbering of the shaft.

The several parts of shaft-sets are named with regard to their position relative to the shaft. Primarily the frame consists of the timbers of the rectangular set, proper, together with those distance pieces, called 'posts,' which retain it in position at a required distance from the adjacent sets above and below. The rectangular set of the frame is made up of jointed

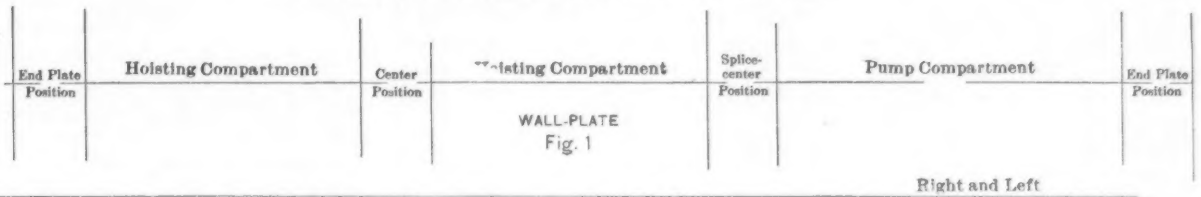
Such being briefly a description of the different parts that are assembled together to form the rectangular shaft-set, I will proceed to discuss the methods whereby the timbers are cut and framed in order that they may properly and truly join together and fit exactly at the joints. (See Plate II.) I will assume that they are of the desired length, that they are square-sawed to the required cross-sectional area; but in the latter instance they are certain to vary slightly from the exact dimensions and often may be more or less twisted. One side or face, therefore, is selected—the most perfect and even one—if there should be marked imperfections, and this face is taken as a basis of operations. (Fig. 1, *a, b, c, d.*)

It is necessary in the first place that this face shall be true, that is, without bend or twist as regards both its length and its breadth. Care in this particular is essential, as it determines the exactness with which the timber shall fit its companion pieces at their common joints in the assembled set, and therefore upon a perfect plane throughout or, by means of it depends in large measure the perfection of the set itself. Where extreme precision is required, either the selected face is worked to straight-edges, sighting from one to another until at proper points the face has been worked to line with the assumed plane which is shown when the edges of the straight-edges are brought to coincide; bends and twists are removed locally wherever it may be necessary to frame a joint. In the process of framing many prefer to select for this face the one that will be the top or uppermost side of the timber when in its place in the set and to take all lines, measurements and angles with regard to it, but for sufficient reasons the writer believes that the basis of all framing should preferably be that which will become the interior face of the piece when the parts shall have been assembled.

Upon this face a center or base-line is marked from end to end, either by means of a straight-edge or the chalked line, and all measurements lengthwise along the timber are laid off with reference to this line, as also are those crosswise lines which locate and outline the shapes of the joints to be framed upon the selected face, the relative positions thereof having been established by the measurements. This base-line represents a line at which should

PLATE II.

LAYING-OUT AND FRAMING RECTANGULAR SHAFT SET.



WALL-PLATE
Fig. 1

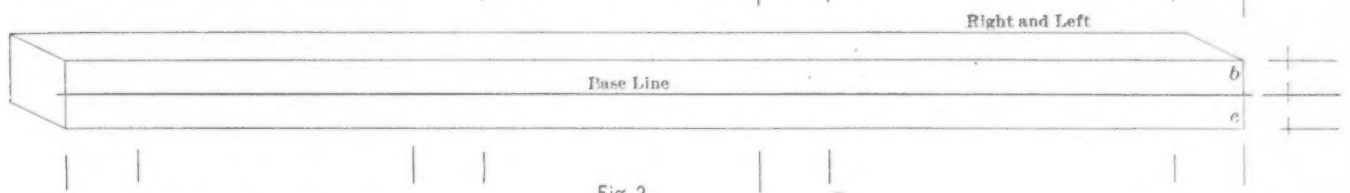


Fig. 2

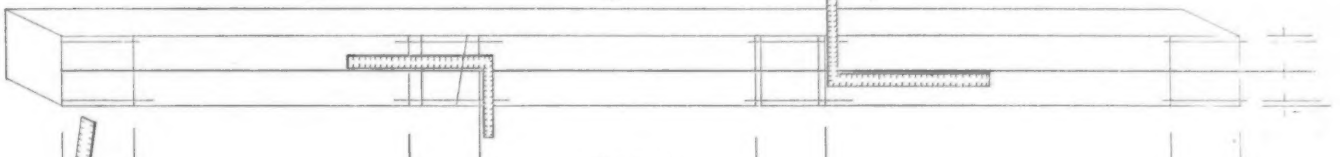


Fig. 3

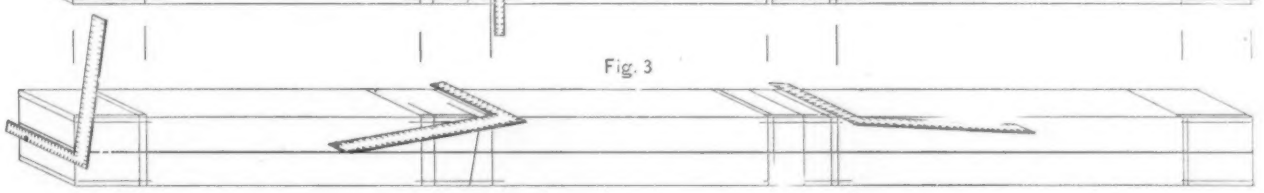


Fig. 4

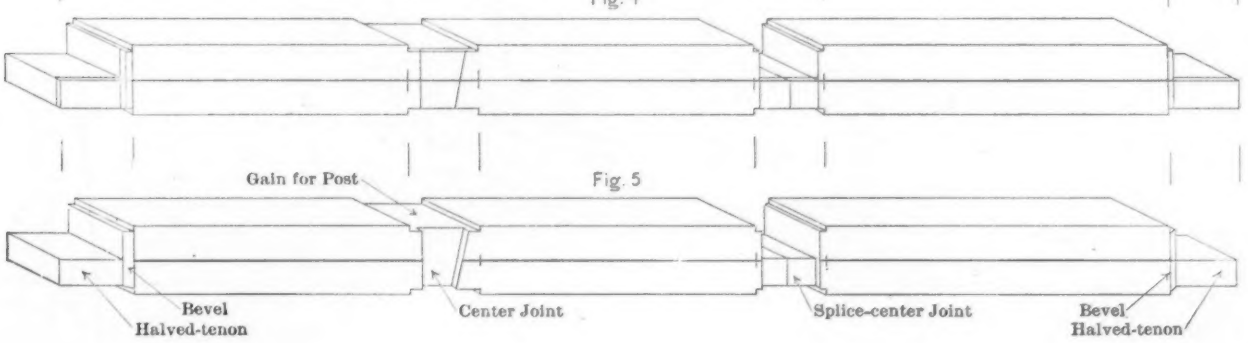
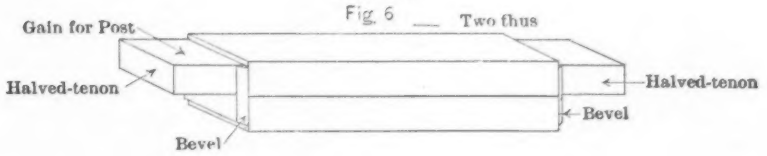
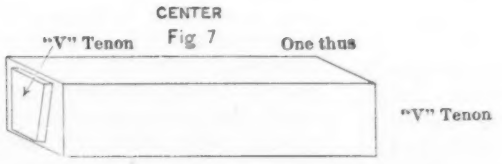


Fig. 5

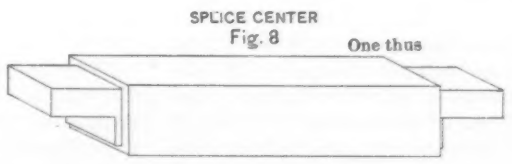
END-PLATE
Fig. 6 — Two thus



CENTER
Fig. 7



SPLICE CENTER
Fig. 8



a second imaginary plane be passed lengthwise through the center of the timber at right angles to the plane of the selected face it would cut or coincide with the latter throughout its length, and this line of coincidence of the two planes we have fixed upon the face of the timber by marking, so that we may employ it as a basis for the laying-out and framing of the joints. (Figs. 1 and 2.)

Backward from this face to required distances, there are laid-off tenons, mortises, gains and miters that go to make up the joints which will allow the different parts of the set to be brought together into one complete and perfectly connected whole. (Fig. 3.) By thus taking all measurements from the baseline towards the top or bottom part of the timber, and by projecting the points and lines thus established backward from its selected inner face towards its outer face or back, all troubles due to twists or variations in the size or shape of the pieces going to make up a properly framed set may be overcome and the joints thus framed will be in their correct relative positions, exact in size and shape, and they will join accurately with those of the other connecting parts of the set. It is needless to say that exactness in the fitting together of the joints cannot be expected unless all necessary precision has been employed in their framing.

The joints that must be framed in the construction of a set are: those at the corners of a shaft, which connect the wall-plates and the end-plates at their ends; those connecting the centers and splice-centers with the wall-plates at the division of the compartments; and, where it is required or used, the 'boxing' of the ends of the posts into the frame in order to insure that they shall retain their proper positions. The framing of the wall-plates and the methods of cutting their joints are shown in Figs. 4 and 5; that of the end-plates, Fig. 6; of the centers, Fig. 7; and that for the splice-center in Fig. 8.

The wall-plates and end-plates are joined together at right angles to each other by a combination of the tenon and miter, or 'bevel,'

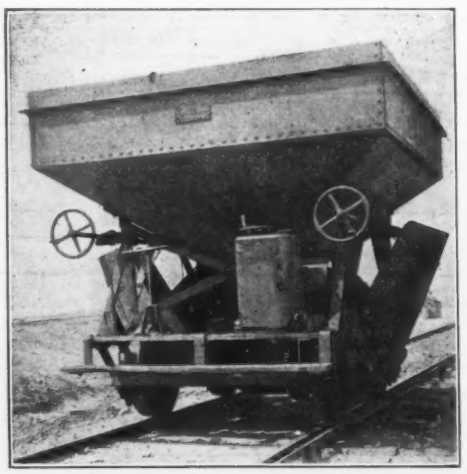
as the latter s usually designated. The thickness of the tenon is just half that of the plate, the measurements therefor being taken from the center or base line on which is formed one face of the tenons, their lengths being equal to the widths of the mating tenons of the joints. The wall-plates invariably have their tenons at the bottom half of the pieces that they may support the end-plates while the set is being placed in position in the shaft, the tenons of the end-plates on the contrary being framed at the upper half of the ends in order that they may rest upon and be supported by those of the wall-plates when the parts are assembled. This halving the timbers in framing tenons for the purpose of support removes just one-half of their cross-section and thereby weakens the pieces at such points proportionally. This difficulty is overcome by the use of a half right-angled miter, of 45°, which is framed from the face of the timber backward usually to a depth of one inch, or, in other words, the piece is so beveled that this mitered face will coincide with and abut against a similar miter that is framed upon the companion piece, both being placed in the same relative position within the joint. By means of this construction of the corner joints of a shaft-set it is brought about that the full cross-section of one plate engages the full cross-section of its companion plate at their common end, at which point the two pieces are at right angles to each other, and thereby it is assured that the full strength of one of the timbers supports and is supported by the full strength of the other.

In the case of the simple divisional girts or centers instead of tenoning through the width of the wall-plates at the joints, as do the ends and splice-centers, they are connected therewith by a short V-shaped tenon that is mortised into a corresponding gain framed into the inner face of the wall-plates at desired points, the tenon being narrower at the bottom than at the top in order that it may not fall or be forced out of its position. (Fig. 7.) The shoulders of this tenon should be constructed of a width sufficient to engage the face of the plate, whereby it may afford support to the full size of that timber. The simple center with some form of the V-tenon is employed for the purpose of dividing the cross-sectional area of a shaft into compartments, save only at points where the wall-plates are spliced in order to shorten them so that they may be brought to position in confined quarters.

Whenever it becomes necessary to shorten the wall-plates, the timbers are so cut that the splice will coincide with the lengthwise center line of one of the cross-girts or centers that divide the shaft into one or more compartments. Generally, in the three-compartment shaft, which has been taken as a type for the reason that the framing of all of the different joints employed in shaft-sets may be shown in simple detail, this cutting in two or splicing of the wall-plates is made to center between the pump compartment and one of the hoisting compartments. The upper halves of the wall-plates at such points are removed to a width that is somewhat less than the thickness of the splice-center there to be placed, in order that the shoulders extending beyond the sides of the engaging tenon of the center may furnish support against side-pressure to the full cross-sectional area and therefore to the full strength of the plates themselves. (Figs. 5 and 8.)

The posts are not framed, although they should be cut with precision and their ends properly shaped so that they may come truly to position and that the effects resulting from any twist of the timber may be removed. Almost invariably throughout the metal mines of the western United States gains are framed into the plates and centers of the set into which the ends of the posts are boxed, the shoulders of these gains being employed to support the posts in place against the inward thrust of outside pressure. (See Plates I and II.) On the other hand the general practice throughout the eastern portion of the country, in metal and coal mining, is to do away with this boxing of the posts, to frame no gains for their reception, but to set them flush with the top and bottom faces of the set and to depend upon the tightness with which the assembled parts are blocked and wedged into position for retaining them in their place.

In practice certain variations of these several joints are employed, oftentimes to advantage, but the above discussion is intended to describe the practical methods of framing the typical rectangular shaft-set.



ELECTRIC-MOTOR LARRY.

COLUMBITE AND MOLYBDENITE IN OKLAHOMA.—Discoveries of these rare minerals are reported by H. Foster Bain, near Roosevelt, in the Wichita mountains.

MINING IN CROATIA.—A company has been formed in Brussels, Belgium, with a capital of $640,000, to acquire and develop coal mining concessions at Banovina in Croatia.

OPEN-HEARTH STEEL FURNACES IN GREAT BRITAIN.—On December 31, 1903, there were 512 open-hearth steel furnaces in Great Britain, of which 417 were acid, and 95 basic furnaces. Of the total number 372 were in operation and 140 idle. Only 10 new furnaces were reported under construction.

THE GALICIAN OZOKERITE INDUSTRY.—Lower prices for crude wax have encouraged the building of refineries in and around Boryslaw, where so-called refuse material is converted into a marketable product. An attempt is being made, according to report, to centralize the Galican industry. An association with £1,000,000 capital has been formed in London for this purpose. Not only have the existing mines and the entire Boryslaw property been acquired, but negotiations are pending for virgin land in the vicinity of Starunia and Dzwiniacz.

THE GALLITZIN PLANT OF THE PENNSYLVANIA COAL & COKE COMPANY.

The lands of the Pennsylvania Coal & Coke Company, the largest of the great combinations in the Clearfield region, cover a wide area, the main body of the lands forming an irregular tract, 27 miles long and from 3 to 8 miles wide, in the southern part of Cambria county. The plant here described is near Gallitzin, on the main line of the Pennsylvania Railroad, and at the crest of the Alleghany mountains, the west end of the summit tunnel on the Pennsylvania Railroad being at Gallitzin. Two coal seams are worked, the E, or upper Freeport, locally known as the Lemon, and the D, or lower Freeport. As the mines are near the crest of the Alleghany escarpment, the seams dip gently west and are the highest of those found in the lower productive measures. The Lemon seam outcrops on the eastern slope of the mountain, just beyond Gallitzin, while the entire coal formation is cut off a few miles farther east, on the slope from Gallitzin down to Altoona. Most of the coal that the company now produces at Gallitzin comes from the upper Freeport, or E, although the D vein will be developed more extensively than it has been. The coal from the E vein contains 26 to 28 per cent of volatile matter that is therefore somewhat more smoky than many other grades of Clearfield. It is used by railroads and steamships, and happens to be of good coking quality, though the same seam is non-coking 10 miles farther west. The company has now a battery of 480 beehive ovens at Gallitzin. The coke is said to run about one per cent in sulphur and eight to nine per cent in ash.

The power-house at Gallitzin is of stone, with a slate roof. It contains boiler and engine rooms. The boilers are of the ordinary horizontal tubular type, about 700 h.p. in all, and were made by the Keeler Boiler Works, of Williamsport, Pa. Slack coal is now used for fuel, but arrangements are being made to burn the breeze, or fine coke, that accumulates about the ovens and for which there is little market. Forced draft is obtained by a fan 6 ft. in diameter and 42 in. wide, driven by an Atlas engine. In the engine room there are two Erie City four-valve 20 by 30-in. engines, belted to electric light and power generators. One is belted to a 100-kw. alternator for electric lighting and to a 250-kw. direct-current power generator of the Western Electric make; the other is belted to a 200 and a 100-kw. direct-current motor. The alternating current is used for lighting the mine plant and also the town. The switchboard has three generator and four feeder panels on the power-board, and two generator and two feeder panels on the lighting-board. There is also a General Electric series arc-light system for the town. A 5,000-volt step-up transformer takes current at 1,600 volts from the arc-light generator. The power generators run at 250 volts.

Ventilation for the mine is furnished by a 20 by 5-ft. Guibal fan, driven by an electric motor, which runs at 130 revolutions; it has a capacity of 240,000 cu. ft. of air per minute, against a 3.75-in. water gauge. The fan is regularly moving 120,000 cu. ft. at a 2.5-in. water gauge. The fan runs exhausting; though sometimes in the winter it is reversed in order that the return air-current may keep ice from forming on the main slope. In the whole mine there are five splits, the mine

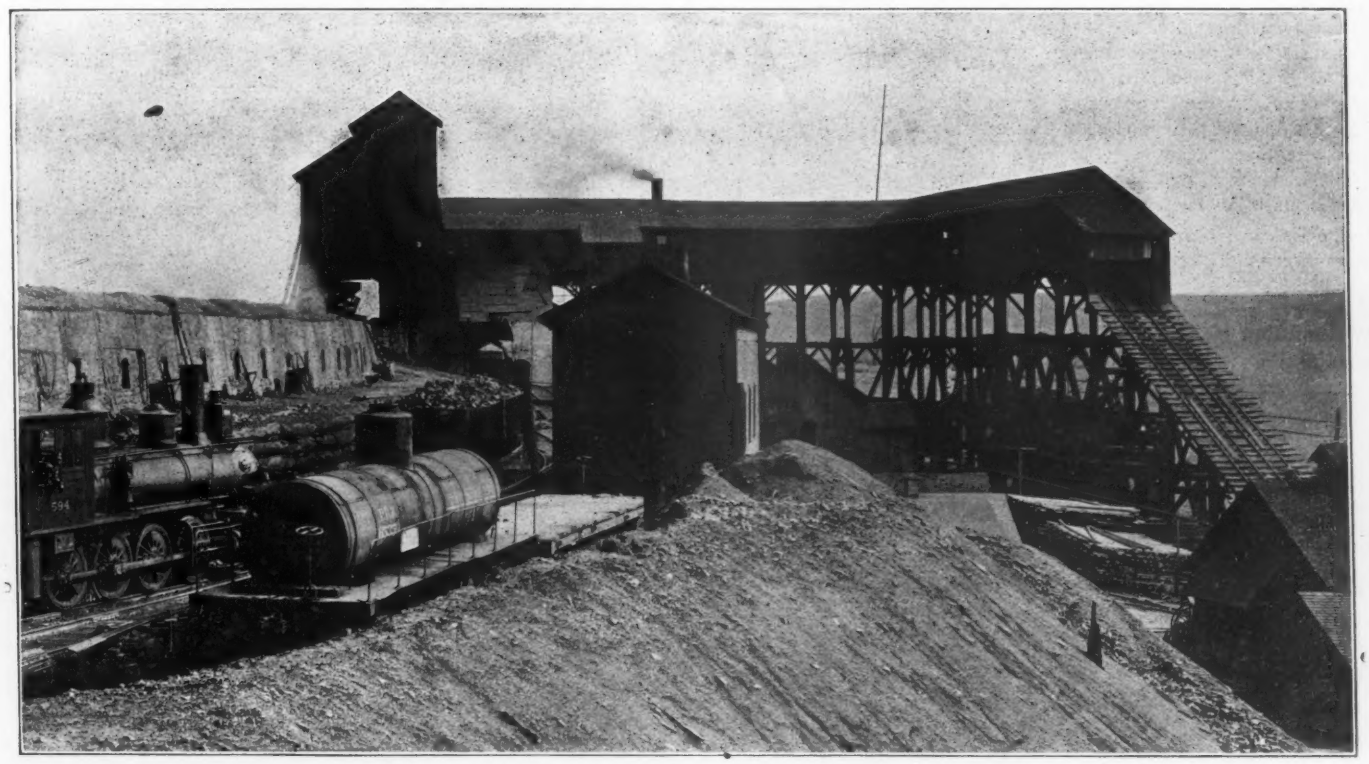
openings now covering an area nearly 3.5 miles long and 1 mile wide. A small Stine fan is used as an auxiliary.

The coal is about 4 ft. thick, from 48 to 54 in., with some bony coal on top and there is 8 to 10 in. of bony on the bottom as well. Four to 4.5 ft. are taken down in the rooms and in the gangways enough more to give a height of about 5 ft. over the rail. The coal, like that of about all mines in the Clearfield region, has no pronounced joint structure, but breaks easily in almost any direction. It is fairly firm. Jeffrey electric machines are used for undercutting, 13 of which are now in use. They undercut the coal 6 ft. in depth and 5 ft. in width, and 40 cuts make a day's work for a runner and his helper. The Lemon coal powders up easily and the bottom is free from sulphur, hence chain machines are more advantageous than would be machines of the puncher type. The roof is excellent and accidents are very rare. The manager states that, although 325 men work below ground when the mines are running at full capacity, there has been but one fatal accident in four years. The mines are free from gas, and open lights are used throughout the workings. The mine is laid out on the double-entry, room and pillar system, rooms being from 275 to 300 ft. long and 36 ft. wide, leaving a 24-ft. pillar. The main gangways are 15 ft. wide, as are the aircourses. The coal dips gently to the west, and a drift from the bottom of a neighboring ravine drains the larger part of the mine workings. Mules are used to gather the cars at the face of the chambers and haul them to the main haulage roads, where they are made into trips and hauled to the foot of the main slope, which has a vertical depth of about 300 ft., by electric locomotives. There are three Morgan-Gardner 12-ton locomotives in the mine and one Jeffrey. The mine cars hold about two tons. The electric haulage roads are well laid with 40-lb. steel rails, while 16-lb. rails are used for mule haulage.

The 480 coke ovens are nearly all in a single block, a mile long, in a curved line following the contour of the mountain side. The ovens are all of the beehive type, 12-ft. centers and 6 ft. high, making 48-hour and 72-hour coke. The charge for 48-hour coke is about 5 tons and for 72-hour 7 tons, the yield per oven being about six-tenths of the coal charged. An electric larry line runs over the tops of the ovens. There are five larries, holding 7.5 tons each, taking current from a third rail by means of a sliding shoe. The larries were made by Kenney & Company, of Scottdale, Pa.

The direct-current used for the mining machines and locomotives is carried from the power-house to the top of the slope by 12-0000 copper wires. The longest distance direct-current is carried is about two miles. The tipple, of wood, is equipped with a cross-over dump, a disintegrator for reducing mine run to slack for coking slack bins and with screens for making slack, nut and lump sizes. The coal is shipped in such sizes and also as run-of-mine. The output of the mine in 1902 was 335,097 tons of coal, while 117,733 tons of coke were made.

E. T. Conner, of Cresson, is division superintendent of the Pennsylvania Coal & Coke Company.



TIPPLE AND COKE OVENS AT GALLITZIN.

DISCOVERY OF LODE-TIN IN QUEENSLAND.—In the *Australian Mining Standard,* December 10, 1903, information is given of the development of new tin deposits in the vicinity of Reid's creek, Queensland. The ore occurs in veins cutting granite and slate, and in places is very rich. From one vein 5 ft. wide, material has been taken out which yielded 18 per cent black tin, while another vein of still larger size also carries rich ore. Several properties are now under development, and the higher-grade ore is being transported in wagons to Irvinebank for crushing.

THE BESSEMER CONVERTER IN BASIC STEEL MAKING.

According to the Cleveland *Iron Trade Review,* experiments were made last year at the basic open-hearth steel plant of the Tennessee Coal, Iron & Railroad Company at Ensley, Ala., in which hot metal from the blast furnaces was first blown in a small bessemer converter before being introduced into the open-hearth furnace. The company recently completed the installation of a large converter, which is now in operation. The hot metal from the furnaces is taken directly to the converter and after the customary blowing process, in which considerable silicon is burned out, is poured into the open-hearth furnaces. Owing to the preliminary blow, it is expected that the metal will take only about half the time in the open-hearth furnace that used to be necessary for it to come to steel of the desired analysis. Thus the open-hearth furnaces will have their output very largely increased. It is too early at this writing to say much about the practical results of the departure, as the tests have not yet been on a large enough scale to make sure, but the preliminary reports are highly satisfactory.

COAL IN JAPAN. — According to the United States Consul-General at Yokohama, Japan, a deposit of smokeless coal, underlying about 1,500 acres, has lately been discovered in the island of Hokkaido, and the discoverer is now applying to the authorities for permission to work the mine.

THE CANADIAN MINING INSTITUTE.

The annual meeting of the Canadian Mining Institute began at Toronto, March 2, with a good attendance, though a number of members were delayed in reaching the city by the severe snowstorm of the preceding day, which interrupted travel on nearly all the railroads. Unfortunately, the meeting was clouded by the news of the death, at Ottawa, on Monday night, of B. T. A. Bell, who had been secretary of the Institute since its organization, and stood high in the esteem of the members. His career is referred to on another page.

The meeting began in the large hall of the King Edward Hotel at 10:30 a. m., on Tuesday. The first session was the business meeting, at which the reports of the officers and council were presented, committees appointed and other matters disposed of.

Resolutions of sympathy with Mrs. Bell were passed. Messrs. Coste, Brown and Major Leckie were appointed a special committee to represent the Institute at Mr. Bell's funeral on Thursday. It was decided that in view of the loss sustained by the Institute, the annual dinner on Friday should be omitted from the programme. A resolution was passed authorizing the Council to appoint an acting secretary until a regular election could be held. Messrs. Obalski, Hobart and Mills were appointed scrutineers of the ballot for officers.

The Council report shows the total number of members to be 435, of whom 78 are student members.

The premises occupied by the Institute in the Windsor Hotel, Montreal, having become too small for the proper accommodation and growing requirements of the library, the Council, at a special meeting called for the purpose, decided to remove the collection to Ottawa, where it is under the personal supervision of the secretary. Members may now obtain a loan of any work of reference in this collection for a limited period by giving a receipt and surety for the value of the book or books so loaned. Already this system has been taken advantage of by a number of members. A new catalogue is being prepared for the printer, and will be distributed among the members when completed.

The annual meeting was held at Montreal on March 4, 5 and 6, 1903, and was exceedingly well attended. The proposal to hold a joint meeting with the Lake Superior Mining Institute at Sault Ste. Marie, in September, was abandoned in consequence of the unsettled condition of the mining and metallurgical industries of that district. Several meetings of Council and special committees were held at Montreal and Toronto. A meeting of the Eastern Ontario section was held at Kingston in November, and a number of interesting subjects discussed.

The papers read before the British Columbia meetings held at Nelson in September, 1902, and at the annual meetings in March last year, some 30 in all, constituting the contents of Volume VI. of the *Journal* of the Institute, were, unfortunately, destroyed by fire in June on the eve of the completion of the volume. Owing to delay in the re-equipment of the contractors' printing plant, and the secretary's absence, first in the Yukon and later in Great Britain, the work of resetting the lost volume was not begun until his return early in December, but by dint of hard work, it has been completed.

At the close of the year the secretary compiled and printed in pamphlet form a very complete and handily arranged volume of indices to the authors and papers read before the Institute, and its antecedent organizations from 1891 to the end of 1903.

Arising out of the suggestions contained in the paper presented by Mr. W. Dixon Craig at the last annual meeting, circulars have been issued, not only to members of the Institute, but to many other Canadian chemists and metallurgists, with the object of bringing to a focus the question of organizing a Chemical and Metallurgical Section.

Nine papers were submitted by student members. The Committee of Award in the Geological Section (Messrs. Goodwin, Adams and Walker), recommended that the cash prize of $25 be given to Mr. S. H. Boright for his paper 'On the Geology of the Northern Portion of the Boisdale Hills Anticline.' In the Mining Division the committee (Messrs. Hardman and Coste), recommended that Mr. Norman W. Parlee be given a similar cash prize for his paper on 'Rock Drilling and Blasting.' None of the papers being deemed to have sufficient merit to warrant its award, the president's gold medal was not given.

The audited statement of the treasurer shows a cash balance on hand of $2,913. This unusually large balance is, of course, largely due to the fact that Volume VI was, owing to the fire, not issued during the year. The receipts for the financial year ending January 31, 1904, were $6,061; the disbursements were $4,831, in all.

The Wednesday afternoon session opened with the annual address by President Eugene Coste. Mr. Coste referred to the fact that all previous meetings had been held at Montreal, and he expressed his pleasure that the Institute was now meeting in his native province. The membership tended more and more toward the west, 108 Ontario members, 68 from British Columbia, and 11 in the Yukon, having to be set against 69 from Quebec and 30 from Nova Scotia. He outlined the historical development of the Institute from the various provincial mining societies. The government had recognized the value of their publications by an annual grant of $3,000.

They were the only body in the Dominion upon whom it devolved in the terms of their charter to take "concerted action in such matters as affect mining and metallurgical interests in Canada." Their recommendations to the government had invariably been accepted. Three notable instances were adduced. Export duties on nickel ores and matte were not imposed, though approved by the Ontario government in 1899. Taxes on nickel and copper ores and matte had been recognized as an interference with the industrial independence of these interests, which was essential to their development. The reduction to 2.5 per cent of the export gold duty in the Yukon was a third point in which they had used their influence. They had helped to defeat the alien labor and eight-hour laws in British Columbia. Good roads and mining legislation in the Yukon and the free listing of gold, dredging and mining machinery were other matters in which they had acted.

The president then discussed at some length the possible aid to mining which could be rendered by the government. He called attention to the fact that, notwithstanding the great growth of the mining industry, the Geological Survey appropriations had not been increased, and its operations had been restricted by limited means. He advocated a great extension of the work now done; whether such extension could best be made by the establishment of a new bureau, or by extending the organization of the Geological Survey, would be a matter of detail. In either case the proposed bureau ought to contain several branches, as the general administration; the geological survey proper; the topographical and geographical survey; the preparation of reports and monographs on mining districts and mineral deposits; the collection of statistics; economic results and commercial facts bearing on the mining interests—which would be closely connected with the statistical bureau; and a department interested in metallurgical and chemical work.

The work of such a department would not interfere wth the mining rights and the making and administering of mining laws in the several provinces. To them would be reserved the selling and leasing of mineral lands, the inspection of mines, the keeping of maps, plans and records; the collection of dues, license fees, taxes or royalties; the collection of statistics; the fostering of technical education, public assay offices, roads and transportation in mining districts; custom concentration and reduction works; deep sinking and testing deposits; issuance of papers on newly discovered mineral districts, etc.

An interesting paper by Mr. Frederick Keffer on 'Mining in the Boundary District, B. C.' was then read. It supplemented his paper presented at the 1902 meeting, describing the improvements in mining and handling ore recently made. This was followed by a paper on 'The Rossland Ore Deposits,' by Mr. E. B. Kirby. This called out a long discussion, in which Messrs. Thompson, Barlow, Ingall, Mickle and Coleman took part, on the geological questions affecting the probable origin of the Rossland ore-bodies. Some of the speakers attempted to show analogies with the Sudbury district.

Mr. W. Thompson then gave some account of the work now being done on the low-grade ores of the Rossland district, including the application of the Elmore oil concentration process.

Another session was held in the evening, at which Mr. Thompson gave an interesting account of the method adopted by him in building bulkheads in the Nickel Plate mine at Rossland. These bulkheads were required to hold back water in an adjoining mine, this water having a head of 450 ft. They were built of brick and cement and proved equal to the work.

Mr. R. W. Brock then read a paper on the 'Lardeau District, B. C.' The paper was illustrated by a number of maps and photographs. In this district the discovery of the Poplar creek and other new gold-fields has caused much excitement. The district extends from the head of Kootenay lake to Arrow lake, and contains three zones of mineralization. The district between Poplar lake and Silver Cap mountain has not yet been prospected, but the rich strikes of free gold at Poplar creek were very remarkable. The Lucky Jack claim had been staked three years ago and thrown up by Buckle, the original prospector. It lay within a stone's throw of the railway, which ran past it for a year before the rich discovery had been made. It was full of free gold.

Dr. Barlow showed a number of slides of the Sudbury district mines.

Mr. B. A. C. Craig described the new concentration mill of the Canadian Corundum Company.

Dr. W. A. Parks made an address on the value of the study of stratigraphical geology, which, he claimed, was being neglected for petrography. The importance of this branch of study was shown. Mr. Coste, who is the greatest economic stratigraphist in the country, had discovered the two oil-fields on which the Canadian manufacture of oil depended. Stratigraphical research might develop other native resources.

Mr. S. Dillon Mills read a paper on 'Recent Rock Movements in the Laurentian,' which was rather severely technical.

The session on Thursday morning was a special one for the reading of students' papers. The following were read and discussed: 'Relative Attraction of Different Minerals for Residuum Oil,' J. F. Hamilton, School of Practical Science, Toronto; 'Limitations of the Cyanide Process,' T. H. Plunkett, School of Practical Science, Toronto; 'The Treatment of the Dry Ores of the Slocan District,' T. W. Cavers, School of Mining, Kingston, Ont.; 'Notes on Some Deposits in the Eastern Ontario Gold Belt,' C. W. Knight, School of Mining, Kingston, Ont. These papers generally showed careful work.

The afternoon session was adjourned as a mark of respect to the memory of B. T. A. Bell.

At the evening session Mr. J. Obalski read a paper on 'Minerals Containing Radium Found in Quebec.' These minerals included a remarkable specimen obtained from a pegmatite dike at the mica mine near Lake Pied des Monts, about 18 miles from Murray Bay, in the county of Charlevoix, Quebec. Analyses of part of this specimen showed 70.7 per cent uranium oxide, and it exercised a strong radio-active influence. Several photographs taken by means of the radio-activity were shown. Another specimen was a substance resembling coal, which was also found in a pegmatic dike. The ashes from this contained a large percentage of uranium oxide and showed a high degree of radio-activity. We expect to give Mr. Obalski's paper in full next week.

Dr. McLennan of the University of Toronto, who has devoted much attention to the study of radium, said that it was interesting to learn that such ores had been discovered in this country. He suggested that the exploring parties in different parts of the country next summer should be provided with testing apparatus, which could be made quite inexpensively, but of great sensitiveness. He mentioned the metals with which he had been working and added that by passing air through crude petroleum he had obtained a highly radio-active gas. In reply to Prof. Miller, he said that so far the only economic use of radium was in medicine. He stated that Prof. Curie of Paris had been forbidden to obtain any more of the ore from Austria, as, owing to the great value of radium, an embargo was put on the ore, and he was unable now to produce good radium. The professor was now looking elsewhere and would be glad to buy such ores from Ontario or Quebec. Dr. McLennan suggested that the government should give a bounty for the discovery of specimens of the ore.

Mr. E. L. Fraleck of Belleville said that white mica had also been found north of Cloyne, in Frontenac county; at Oak Lake, Peterboro' county; in Sheffield township, near Tweed—all in eastern Ontario, in addition to the places mentioned in Quebec by Mr. Obalski.

Prof. Miller said that even more remarkable than the cleveite was the specimen of coal. The white mica deposits in eastern Ontario would be explored this summer by an electric company, which hitherto has been obliged to import from India.

By invitation, Mr. E. J. Davis, Commissioner of Crown Lands of Ontario, made a short address, referring to his pleasure at meeting such a representative body of members of a profession with which a branch of his department was so nearly concerned. He said that he had always tried to meet the suggestions and wishes of the mining engineers. He had found that they favored the abolishing of royalties, and he had done so; he had found they desired no further alteration in the mining laws, and he had therefore left them unchanged. He was impressed by the large number of young men whom he saw present at the convention, and he regarded this as a hopeful sign for the development of the country's mining interests. He referred appreciatively to the valuable services of Prof. Miller, Prof. Coleman and Mr. Thomas Gibson. Mr. Davis, in closing, expressed his willingness to give all possible assistance to the mining interests of the province.

Professor Coleman read a paper prepared by A. B. Willmott, of Sault Ste. Marie, on 'The Exploration of the Ontario Iron Ranges.' Mr. Willmott referred to the geological similarity between certain belts in Ontario and those found south of Lake Superior. Flattering politicians kept telling the people that Ontario and Quebec abounded in iron ore of the first quality, yet the Hamilton, Sault and Midland furnaces had only one large producing mine to draw from. Mr. Willmott, however, believed that the politicians were correct and that the lack of known ore bodies was owing to the fact that they had not been properly sought. He then went into the discussion of the best method of interpreting and verifying the numerous surface indications found. He instanced the Josephine and Frances mines as instances where surface indications were slight, but where deep drilling had met with entire success. During the past two years some intelligent and systematic work had been done on the Steep Rock, Animikie, Michipicoten and Hutton ranges, and in most cases good ore bodies had been discovered. The work done in Ontario, however, was trifling compared with that going on on the American side of Lake Superior. The time had gone by when ore bodies were found by running through the woods with a canoe and a pick. Iron ranges had been found, and the question of their value could only be determined by careful and intelligent work.

This led to a brief discussion, in the course of which Mr. McCharles, of Sudbury, spoke of his experience in trying to interest Ontario capitalists in the Hutton iron range, near Sudbury. He had been unsuccessful, however, and had to go to Chicago in order to secure capital. United States investors had already spent about $80,000 on the Hutton property, of which they were now sole owners.

Mr. F. T. Snyder read a paper on 'Magnetic Separation,' in which he reviewed the history of the process and showed a number of samples which indicated that important progress had been recently made. In the spirited discussion which followed, it developed that Mr. Snyder was himself the inventor of a magnetic concentrator of a new type, with which very successful work had been done.

On Friday morning another special session for the reading of students' papers was held. The following papers were read: 'Mica,' E. T. Corkill, Kingston; 'Pioneer Iron Mine, Ely, Minnesota,' E. J. Carlyle, McGill University; 'Chlorination at North Brookfield, N. S.,' H. Forbes, McGill University; 'Notes on Mining in the Regent Group,' Negaunee, Mich., M. B. Atkinson, McGill University; 'The Tyee Mine,' Vancouver Island, B. C., D. C. Livingstone, McGill University. Owing to lack of time several other papers, submitted in competition for the students' prizes, were read by title only.

At the afternoon session on Friday an interesting paper was read by Mr. W. G. Miller, Provincial Geologist, of Ontario, on 'The Undeveloped Mineral Resources of Ontario.' In opening he referred to the effects of the ice age on geological conditions in Ontario. This age had furnished the modern agriculturist with a grievance by stealing Ontario's rich soil and carrying it south of the great lakes, but on the other hand it had been a boon to the modern mines, laying bare vast stretches of rocks rich in minerals.

Probably one-half of Ontario's 220,000 square miles was rocky surface, roughly divided into Huronian and Laurentian formations. The belief had been prevalent that the Laurentian rocks were practically barren of merchantable minerals, but Prof. Miller did not agree with this view. Already the presence of many rare minerals had been determined in Laurentian formations, and with the advance of mining methods they would prove profitable fields for exploration. The wide area of gold-producing rocks discovered gave promise of vast undeveloped resources of this metal. The present state of the gold-mining industry was due chiefly to incompetent management, stock jobbing and other speculative factors. With the parasites and other unhealthy influences removed the industry should make material advancement.

A valuable silver mine was in operation at the head of Lake Superior, while silver had been discovered 500 miles east. In the vast unexplored region which intervened there might be an almost priceless supply of silver.

The abundance of iron already in sight was an indication of the extent of undeveloped resources in this mineral. When facilities for transportation were provided, these would become paying properties.

Good reasons existed for the belief that diamonds would yet be found in northern Ontario, the necessary geological conditions being found there.

In concluding Prof. Miller drew attention to the table showing Ontario's mineral production in 1892 and in 1902.

In discussing this paper Mr. Gibson referred to the success attained in briquetting Ontario peat. He also stated that it was quite possible that lignite deposits might exist in the still unexplored area north of the Height-of-Land.

A paper contributed by Mr. A. C. Garde, of Sandon, B. C., called attention to the waste of zinc which had been going on and reviewed some methods for overcoming the difficulty.

Dr. McLennan of Toronto University made some interesting experiments with radium for the information of the delegates and showed them a small electroscope, suitable for engineers' and prospectors' use, by which the radio-activity of minerals could be tested.

Major Leckie then read an interesting paper on 'The Nickel Deposits of Norway,' and their possible value.

A paper by Mr. J. A. Dresser, of Montreal, described an area of copper-bearing rocks in the Eastern Townships of Quebec, between Lake Megantic and the Arnold river, near the Maine boundary. These he believed to be a continuation of the New Hampshire copper ranges. The building of the Grand Trunk Pacific would open up this region and permit these copper deposits to be developed.

The president stated that the Council had decided to issue the papers presented in pamphlet form as soon as they could be printed, without waiting for the completion of the annual volume of the Transactions. A number of papers were read by title.

The scrutineers announced the following officers as elected for the ensuing term:

President—Eugene Coste, Toronto.

Vice-President—E. B. Kirby, Rossland.

Treasurer—J. Stevenson Brown, Montreal.

Council—J. McEvoy, Fernie; W. F. Robertson, Victoria; A. W. B. Hodges, Granby; W. G. Miller, Toronto; Major R. G. Leckie, Sudbury; John Blue, Eustis; Frank D. Adams, Montreal; Graham Fraser, North Sydney.

As the by-laws require nominations to be made three weeks before the convention, no nomination could be substituted for that of the late B. T. A. Bell as secretary. The Council will name an acting secretary, who will fulfil the duties of the office until the next convention.

The concluding session of this meeting was held on Friday evening. Mr. T. W. Gibson opened the evening session with a statistical paper showing the progress of mining and the manufacture of the products of mining during the past year in Ontario. The total output for 1903 was about 4.5 per cent less than for 1902, but the special causes, such as the Sault situation, leading to this reduction, when carefully considered, showed that progress had been most satisfactory. He referred especially to the remarkable growth of the cement industry in Ontario and to the possible overpassing of the demand by construction.

A discussion followed, in which a number of members joined. In this reference was made to the great extension in the uses of cement, as in buildings, in culverts and bridges, in foundations, in lining mine shafts, etc. Particular reference was made to the use of reinforced concrete, or concrete and steel construction.

Professor L. T. Walker of Toronto University spoke briefly on 'The Geological Survey of Canada as an Educational Influence.' He reviewed the good work done by the survey in issuing reports and preparing collections for educational institutions. Prof. Walker, however, thought the government should make the survey of greater benefit to the mining interests by allowing geological students to join the survey parties, in order to acquire experience in field geology and woodcraft. Students had no other opportunity to become practical geologists.

In the ensuing discussion Dr. Adams of Montreal expressed his entire concurrence with Prof. Walker's views. Mr. W. D. Craig, of the Canada Corundum Company, said it was a difficult thing to find Canadian geologists who had training in field work. Prof. Parks and others showed the great assistance which the Survey might give to the mining schools, while Drs. Bell and Barlow spoke in defence of the Survey and referred to the small appropriations for the work. At the conclusion of this discussion the Institute unanimously adopted a resolution presented by Mr. Craig:

"That the president (Eugene Coste), Major Leckie, Treasurer Brown, Dr. F. Adams, Prof. R. W. Brock, Prof. T. L. Walker and B. A. C. Craig be a committee to confer with the Minister of the Interior and the heads of the provincial mining bureaus on the necessity of giving preference to geological students when making up geological survey parties; and that the committee also point out the necessity of the Minister of the Interior and the provincial government taking steps to maintain the efficiency and increase the size of the permanent geological staff."

Mr. Coste then read a paper on 'Some Suggested Improvements in the Mining Laws in Canada.' He advocated the passage of a Dominion mining act, to take the place of the present clumsy system of regulation by order-in-Council. He pointed out the anomalies existing in various provinces. In some sections owners of placer mines were compelled to perform assessment work to the amount of $40 per acre each year, while quartz mine-owners only had to do work to the extent of $2 per acre for five years. He favored the imposition of assessment work to the amount of $5 per acre on all mining lands, with immediate forfeiture to the Crown in case of non-compliance. He pointed out that only about one-half of one per cent of the mining lands granted in Ontario in the past six years were being worked. This meant that the chances of finding paying properties were reduced to one in several thousands. It was no wonder there were so few good mines in Ontario, when these lands, obtained directly from the Crown, were kept lying idle. If the present rate of grants was kept up the province would have no mining lands left in 15 years and they would have passed instead into the hands of private owners, who would not carry out the regulations. It was to overcome this tendency on the part of owners that Mr. Coste favored the imposition of more assessment work. He characterized the inactive claim owners as drones, who did no work themselves and would not permit anybody else to take advantage of the country's resources. He contrasted Ontario's mining regulations with those of the other provinces, with regard to the laws regulating mining leases and grants. The main point made was that the present system in Ontario, and most of the other provinces, enabled the lessee or claimholder to lock up mineral lands, shut off prospecting and to keep the lands idle as long as he saw fit. He suggested that the law ought to provide for some return to the people for a grant, either by doing work on their claims or by the payment of a yearly tax, if no work was done. The principle was that the grantee should make some return, either in development or money.

With regard to the Dominion, he thought it was due to the people that the great interests of the Yukon and the promising mineral fields of some other territories—such as Alberta, Assiniboia and Saskatchewan—should be governed by a known and definite law and ought not to be left to the discretionary regulation of orders-in-council, which are liable to be changed at any time.

This was an exceedingly important paper, and we hope to comment upon it fully at an early date. It was carefully listened to, and its reading was followed by a sharp debate.

Many members took part in the discussion, including Messrs. Thompson, Hardman, Gibson, Leckie, Blum, Miller, McCharles, Coste, Craig, Hobart and others. Unfortunately, some of the speakers seemed to have missed Mr. Coste's main point, that the law should prevent the locking up of mineral lands by parties who only wished to hold them for a possible rise in value, or, perhaps, to prevent others from working them.

It should be mentioned that in Canada the mining interests and the public lands come under the control of the several provinces. The jurisdiction of the Dominion government extends to the territories outside of the provinces. As these territories cover about four-fifths of the area of the country, including the gold-producing region of the Yukon, its regulations are of great importance.

The discussion continued to a late hour, and it was nearly midnight when the Institute finally adjourned, to meet next year at the place on which the Council shall decide.

This closed a meeting which must be considered a very successful one, notwithstanding the natural depression caused by the untimely death of Secretary Bell. The list of papers was excellent, the attendance large and the meetings interesting. Nearly all the papers read called out discussions of interest, which were closely followed by the hearers. The arrangements made by the local committee were excellent, and the choice of Toronto as a meeting place proved to be very fortunate.

RUSSIA'S PUMICE STONE INDUSTRY.—The war with Japan may interfere with the development of the Russian pumice stone industry. Preparations had been made by the Erivan and Kars board of imperial domains to lease the new Alexandrovka deposits for a term of 12 years. In the first two years the annual production was to be 1,080,000 lb., and thereafter 2,160,000 lb. per annum. In the village of Malaya Kutma, 6 versts from Kars, good quality pumice stone has been discovered near the surface in horizontal strata, sometimes over 2.5 ft thick. The intention is to ship the product in quantity by rail from Kars to Poti, a deep sea port, and thence by steamer to Odessa. Calculating the rental of the land, transportation charges, etc., the cost of the pumice at Kars is 4 to 5c. per pood of 36 lb. What is considered the better quality of mineral may be used for polishing purposes, while the poorer grade can be employed in the manufacture of hydraulic cement.

Dolomite (lime-magnesia carbonate) was named after the French geologist Dolomieu, who first discovered the presence of magnesia in the limestones of the Alps.

NOTES ON SOME RE-GRINDING MACHINES

By MARTIN SCHWERIN.

Two years ago the writer made a series of tests on four types of re-grinding machines in the old concentrator of the Anaconda Copper Mining Company, at Anaconda, Montana. The results of these, together with some observations, are here given in the belief that the interest in this feature of ore-dressing is unabated. That the difficulties and complexities have not diminished is attested by the divergence of opinions held by recent writers.

In any comparison of fine grinding machines and reports of work accomplished by them the condition of the ore fed into them is recognized to have a significant effect. It is evident that the condition of the ore—whether it is fine or coarse—not only affects the capacity and character of work done, but even when these conditions are the same for all, various machines are affected differently by changes in the conditions.

In the published reports of ball-mills working a coarse material from a Blake or Gates crusher and discharging it in a finely comminuted condition, it appears that the machine is well adapted to the work. It is a most efficient screening machine, and on this account it is better adapted to a preliminary reduction of ore in preparing it for a first metallurgical treatment, than it is for regrinding particles that are already reduced to a size approaching that desired in the discharge of the machine; more concisely, it is better adapted to grinding between very wide size limits than it is for re-grinding between very close size-limits.

In the latter case it frequently happens that as much as from 50 to 75 per cent of the feed is already smaller than the width of slot or free aperture of the screen-cloth used in the machine. This was the case at Anaconda, where the feed was wet jig-tailings. The result, in this use of the ball-mill, was a rapid screening-out of the under-size feed with scarcely any grinding. It may be suggested that the remedy is the use of a finer screen in the ball-mill; but this is not the remedy. Practical considerations and the necessity for discharging a jigable product control the size of the screen and do not allow the use of one with much less than 1.5 mm. slots. It is absolutely essential that any successful re-grinding machine should be able to work effectively between close size-limits.

In the appended tabulated results it is seen that the screening ability of the ball-mill and the deterioration in effective crushing increase alarmingly with the life of the lining and screens. This is partly due to the enlargement of the holes in the 'armor-plate' and partly to the wear of the screens. From a diameter at the small end of the holes in the armor-plate of 9-16 in. they wore in five months to 7/8 in. The increased size afforded greater facility for the particles of ore to pass through to the outer screens, thereby escaping the action of the balls. While a granular product is desirable, it must not be attained at the sacrifice of effective grinding.

The tailings from jigs handling the ball-mill product for a period of ten days, during which they were systematically sampled, averaged 0.925 per cent copper. During the same period the tailings from jigs treating the product from Chilean mills averaged 0.595 per cent copper. The feed of both machines was nearly the same in copper value. During the same period the tailings from the first tail-sieve of the ball-mill jigs (treating the coarsest of four sizes made by the hydraulic classifier) assayed 1.3 per cent copper.

Such results are to be expected from an inspection of the assays on the sized products of the two machines. From these we see how much richer in proportion to the assay of the unsized feed are the coarse sizes discharged by the ball-mill compared to the coarse sizes discharged by the Chilean mill. Bearing in mind that the feed is tailings and therefore contains very little, if any, free mineral in the coarse sizes, it is evident that the high assay of those sizes from the ball-mill is a consequence of the failure of the machine to grind them. These particles leave the machine containing the locked-in mineral, to free which was the object of re-grinding. That such enclosed mineral goes into the fine sizes when released is shown by an inspection of the assays of the material discharged by the Chilean mill. It is evident that the ball-mill is not adapted to re-grinding tailings for further concentration.

Variations in Chilean Mill Product Corresponding to Variations in Load.

Copper assay of unsized sample. %	Tons per hour.	Size.	Weight. %	Copper Assay. %	Distribution of copper. %
1.49	2.2	over 20 mesh	9.3	.96	5.9
		" 40 "	32.0	.91	19.6
		" 80 "	20.0	1.15	15.3
		thr. 80 "	38.5	2.30	59.4
1.37	2.3	over 20 mesh	7.5	.87	4.7
		" 40 "	30.3	.78	17.2
		" 80 "	22.8	1.00	16.6
		thr. 80 "	39.4	2.15	61.5
1.30	4.0	over 20 mesh	7.7	.91	5.4
		" 40 "	38.8	.86	25.7
		" 80 "	20.0	1.04	16.0
		thr. 80 "	33.3	2.08	52.9
1.39	5.0	over 20 mesh	13.5	.75	7.3
		" 40 "	37.1	.85	22.7
		" 80 "	19.1	1.09	14.9
		thr. 80 "	30.3	2.54	55.1
1.71	6.0	over 20 mesh	18.7	.83	9.0
		" 40 "	31.8	.97	18.0
		" 80 "	19.7	1.74	20.0
		thr. 80 "	29.7	3.05	53.0
1.58	6.6	over 20 mesh	18.8	.88	10.5
		" 40 "	35.7	1.12	25.3
		" 80 "	19.6	1.52	18.7
		thr. 80 "	25.9	2.78	45.5
1.48	7.25	over 20 mesh	28.1	.95	18.0
		" 40 "	30.2	1.07	21.8
		" 80 "	16.6	1.40	16.4
		thr. 80 "	25.0	2.65	43.8
1.48	8.16	over 20 mesh	26.3	.75	13.3
		" 40 "	34.8	1.08	25.3
		" 80 "	19.0	1.66	21.3
		thr. 80 "	20.0	2.96	40.1
		Huntington Mill Product.			
		Average of 6 samples.			
1.48		Over 20 mesh	12.7	.82	7.0
		" 40 "	43.5	.92	27.0
		" 80 "	17.8	1.52	18.1
		" 160 "	10.9	2.07	15.2
		thr. 160 "	15.0	3.22	32.6
		Krupp Mill Product.			
		Average of 5 samples (during 1st month's run).			
1.98		Over 10 mesh	3.4	1.60	2.7
		" 20 "	20.3	1.65	16.9
		" 40 "	37.6	1.54	29.2
		" 80 "	15.3	1.83	14.1
		" 160 "	13.5	2.70	18.4
		thr. 160 "	11.4	3.21	18.4
		Krupp Mill Product.			
		Average of 4 samples (during 6 months' run).			
1.4		Over 10 mesh	23.7	1.41	22.9
		" 20 "	31.7	1.35	29.3
		" 40 "	29.5	1.28	25.8
		" 80 "	5.5	1.52	5.7
		" 160 "	4.4	2.16	6.5
		thr. 160 "	4.4	3.36	10.1
		Gates Roll Product.			
		Average of 4 samples.			
		Over 10 mesh	14.2		
		" 20 "	30.2		
		" 40 "	29.6		
		" 80 "	12.2		
		" 160 "	5.8		
		thr. 160 "	7.3		

Summary:

	Krupp's Ball Mill No. 8.	Huntington Mill.	Chilean Mill.	Gates Rolls.
Capacity in tons per hour ...	5.0	3.0	6.0	9.0
Screens used (mm.)	1.5	1.5	1.5	1.5
Speed R.P.M.	21	65	34	108
Size of machine ...	Drum 4 ft. 6 in. by 9 ft. diam.	Die Ring 5 ft. diam.	Die Ring 6 ft. diam.	Shells 15 in. face by 36 in. diam.

Another serious objection to it is, that it requires most careful feed regulation when running anywhere near its capacity. When the feed becomes heavier than the machine can handle and continues so for a while, it packs solidly between the screens and the armor-plate, and it becomes necessary to shut down, remove the outside screens, and then rotate the mill to free it. Without shutting down, certain hours of running become necessary, with all feed shut off, to get the machine free again. This is one of the practical considerations, before mentioned, which control the size of the screens. But this objection, like the others, has not the same application when crushing large pieces to a small size, because in this latter case the screening capacity is so greatly in excess of its grinding capacity that no congestion of the screens can occur through the mere mass of material forced against them.

The absence of the dull roar characteristic of the ball-mill when running properly gives warning of the danger from over-feeding. But the world over the 'graveyard shift' in a mill is notoriously heedless of all such warnings.

The size of the Krupp was that measuring 10 ft. 10 in. in height by 15 ft. 6 in. in breadth over all, with drum 4 ft. 6 in. by 9 ft. diameter.

The Chilean mill tested was an original Bradley mill, in which certain improvements were made at the foundry of the Anaconda Copper Mining Company, under the direction of Messrs. Evans and Waddel. The improvements consisted principally of a spider with rigid arms on which the rollers were hung in the place of the three socket-jointed trunnions.

This mill is well adapted to re-grinding lean tailings and poorly suited for comparatively rich tailings or middlings. Lean tailings from copper concentrating contain but a small quantity of sulphides very thoroughly distributed through the quartz grains as minute enclosed particles. It is necessary, in order to liberate the sulphides, that the whole of the feed be very finely pulverized. And in doing this, if the process be not carried too far, there is but slight danger of the liberated mineral particles being ground a second time, thereby unduly sliming them, because of the protection afforded by the larger, harder and more resistant grains of quartz. Such material is the tailings from jigs after fine rolls. It will usually be found more profitable to re-grind the middlings from such jigs in the same set of rolls or in a Huntington mill.

The action most desirable on such middlings is to have each grain cracked open once and then freed. Rolls do this almost perfectly, provided the grains are not too small for effective work. Huntington mills do it less perfectly, but are capable of doing effective work on very much smaller grains. This action would not be sufficient for the poor tailings. On them the cracking or grinding must be repeated. The sizing assays show how well the Chilean mill does this. But this very desideratum for the tailings, if carried out on middlings would be disastrous on account of the larger size of the enclosed sulphide particles in proportion to the size of the enclosing grains of gangue.

The Chilean mill has a large capacity, which is a very necessary adjunct of any machine put to re-grinding tailings. Since the tenor in copper of the first wasted tailings is influenced no less by the proportion cut out for re-grind-

ing than by the character of the re-grinding itself, the greater the proportion re-ground, the poorer will be those tailings sent to the dump.

This machine is not sensitive to varying loads. If over or under-loaded it does its work without serious impairment of efficiency.

The size of the screens is the principal factor in the capacity of the Chilean mill and may even be said to control it. Being on the outside, they are perfectly accessible, as they are in a stamp-mill, and the condition in which they are kept by the attendant is of great importance if the full duty is to be maintained. The output will be almost proportional to the ratio between the number of blinded holes to the total number of holes. But if the duty of the machine be light, a regulation of the character of the discharged product can be exercised through the condition of the screens. By keeping a large proportion of holes blinded all the time almost any degree of pulverization can be attained. The same end, however, can be accomplished better and more directly by the use of finer screens.

Attention is called to the results of the experiment designed to show the variations in the product corresponding to variations in the load. The first column is not important, but it is given to show that there were differences in the assays of the feed. Such differences were unsought and undesirable, but were unavoidable. From the table it is seen that as the tons per hour increase, the discharge contains greater percentages of coarse sizes and smaller percentages of fine sizes. This is explained when it is remembered that the greater the quantity of material in the machine the greater is the amount that is dashed against the screens at each revolution of the rollers and scrapers, affording opportunity for greater numbers of particles to escape without grinding or with less grinding, while the amount of material that is actually ground between the rollers and die-ring is not increased. Also, since there can be no accumulation of feed beyond a certain point, soon reached, the greater the amount fed into the machine the shorter is the time a given particle can stay in it.

In the last column are shown the relative amounts of copper in the several sizes. The lower tonnages, accompanied by more perfect grinding, are also characterized by less copper in the coarse size. This column shows how the slimes run up in copper as the burden on the machine diminishes, and how the coarse sizes carry more as the burden increases. These effects are apparent when the extreme sizes are used as criteria. No information is furnished, apparently, by the intermediate sizes with respect to variations in weight percentages, but the copper assays on these sizes indicate that they are leaner when the amount of feed is small and richer when the amount of feed is large.

The more copper in the coarse sizes (using the last column as the criterion) the less favorable is the product for concentration, bearing in mind, of course, that these are lean tailings in which nearly all of the copper minerals are in very fine particles imbedded in gangue from which a concentrate of the coarser sizes cannot be made. The results are believed to substantiate the statement that the Chilean mill finds its proper place in re-grinding the leanest practicable tailings. If the feed was richer and the individual sulphide particles larger, the effect of sliming would become prejudicial.

Some further elucidation becomes necessary to a complete understanding of the sizing assays. Although the facts stick out plainly enough, the reason is not at once manifest why the same coarse size in the products of different machines shows so great a difference in copper contents, even after making any correction that may be thought proper on account of the initial assay differences between one unsized discharge and another. The mere fact that in the ball-mill discharge there is a much larger percentage of the size designated as over 20-mesh than in the Chilean mlll product is not of itself good reason why it also assays higher. The like sizes in the two products contain unlike material. In the case of the ball-mill the size under discussion contains nearly the identical grains of that size which came in with the feed, while in the case of the Chilean mill product the same size contains a greater proportion of grains newly made from the breaking up of larger grains in the machine. And so with the next smaller size to a less extent. When a large grain is broken it is approximately true that the sulphides find their place way down the table of sizes, while the quartzose material stays nearly where it was in the scale. The grains consisting partly of sulphides and partly of gangue, take intermediate positions corresponding to the predominating component mineral.

The Huntington mill tested was one of the under-driven, geared, 5-ft. size, and was run at 65 revolutions per minute. The product made is seen to be similar to that of the Chilean mill when handling about 6.5 tons per hour. From this it must not be inferred that the results would be so nearly alike on material a great deal richer, such as middlings might be. On the richer feed the Huntington mill results would not change greatly with respect to distribution of copper, while the Chilean mill product would correspond, with respect to copper distribution, more nearly to the results shown for a burden of 2 tons per hour, which, although an actual necessity on the low-grade tailings, would be unnecessary and highly undesirable on rich stuff because the slime losses would be excessive in the subsequent operations. On such stuff, therefore, the Huntington mill shows to great advantage.

With this mill, as with the Chilean mill, screens of any desired degree of fineness can be used, but in the writer's opinion whenever it becomes necessary in concentrating to pulverize very completely material with a hard, tough gangue, that duty should be assigned to a Chilean mill. Wet crushing, between close size limits is premised in every case.

A fault of the Huntington mill is the uneven wearing of the roller rings. Instead of wearing evenly to successively smaller concentric circles, they frequently assume polygonal shapes and then pound around the inside of the die ring instead of rolling in continuous contact with it. When this fault becomes aggravated the grinding falls to a fraction of the normal capacity, and the machine becomes a deafening rattle box. The new 6-ft. mills running at 52 rev. per minute in the west half of the new mill at Anaconda show a very considerable increase in capacity over the smaller ones. They run more smoothly, wear the roller and die rings more evenly and are a considerable improvement in every way.

The rolls tested were Gates' heavy pattern, with shells 15 in. by 36 in., run at 108 rev. per minute, giving a peripheral speed of 1,018 ft. per minute. The usual arrangement of rolls and trommels was used in which the feed first passes to an elevator, then to the trommels, the under-size going to jigs and the oversize to the rolls. After passing the rolls the crushed material joins the incoming feed and goes up in the elevator to the trommels again.

The most conspicuous feature of the roll product is the small quantity of slimes present. When the minerals which will make a desirable concentrate can be set free by crushing the containing tailings to pass 1.5 or 1.25 mm. there there is no machine so well adapted to do it as rolls. On such material the recovery of concentrates after roll-crushing exceeds the recovery following any other machine. Their capacity is far in excess of any other re-grinding machine, crushing to the same size. But the lower limiting size is reached here, unfortunately. The mechanical difficulties present in the rolls themselves which lower their effectiveness when crushing to a finer size, as well as the impracticability and low efficiency of trommels using a finer cloth, has hitherto prevented their use for finer grinding.

However, the day is confidently looked for when rolls will supersede the Huntington mill, which is now the machine best suited to the re-grinding of material to sizes finer than 1.25 mm. when the avoidance of slimes is a prime necessity. Hydraulic classification may take the place of the trommel in the roll system and return the coarse size to the machine, which with improvements in the rolls themselves, in the metal of the shells and in methods of distributing the feed so as to cause more even wear, will undoubtedly enable rolls to do finer work than they are now assigned.

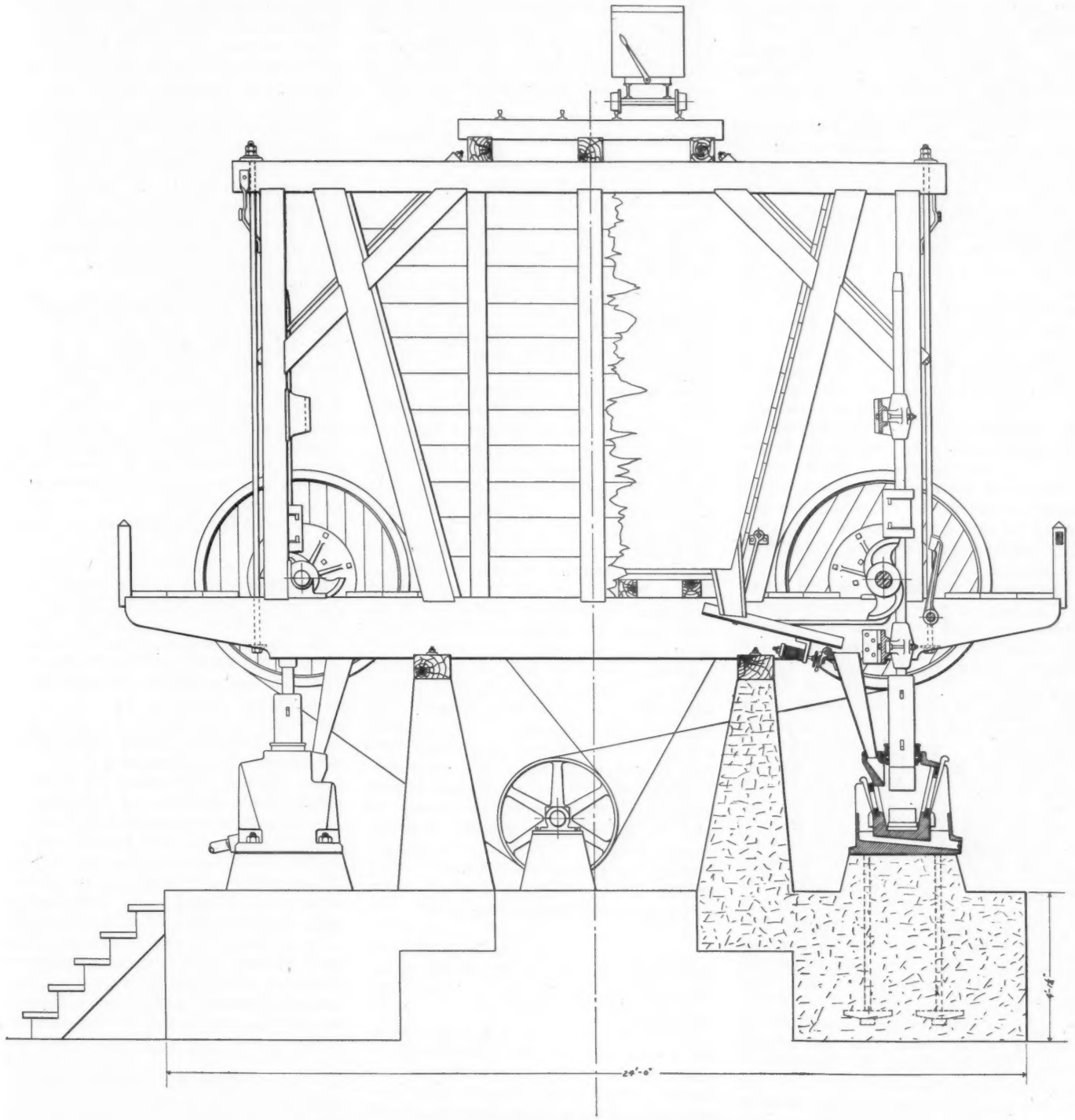
A CANTILEVER BATTERY FRAME.

By IRA C. BOSS.

The invention of the gravity stamp has been credited to Von Maltitz about the year 1505, but the first commercial use of it was made by Paul Gromstetter in 1519, when he established, at Joachimstahl, a process of wet stamping and sifting. Until the nineteenth century the stamp was merely a square timber (with the exception of a few instances when square iron was used) with an iron shoe at the bottom. With the discovery of gold in California came the introduction of this crude machine and rapid improvements in its construction soon followed.

C. P. Stanford introduced the round iron stem, and Isaac Fish suggested a method of revolving it. Zenos Wheeler and H. B. Angel together invented the method of holding the tappet by means of a gib and two cross-keys. Irving M. Scott designed and constructed the first double-arm cam. Zenos Wheeler is also credited with the high-box mortar. About this time the long battery-blocks set on end came into use, but the originator is not known. A general perfecting of details still goes on from year to year.

In stamp-mill design much attention has lately been paid to the construction of the mortar. A vigorous effort has been made to render the quadruple discharge popular, but it was handicapped at the start by faulty construction and impatient criticism. The low mortar with long stamp-head is being built both at Chicago and San Francisco. The object of building this low mortar is to make it possible to guide the stem at a much lower



CANTILEVER BATTERY FRAME, WOOD CONSTRUCTION.

point than is generally practiced, so as to decrease the vibration of the stem and diminish the progress of crystallization. The guides also should be a snug bore, a sixty-fourth part of an inch on the diameter, affording plenty of clearance. This necessitates a careful alignment and a steady back for the guides. Cast-iron will wear the stem much less than wood. A solid cast-iron guide not less than 12 in. long will give excellent results.

Forged-steel shoes and dies give good service, but are more expensive than the best cast-steel and wear no better. The self-tightening cam is being largely used, as it is easily and quickly removed. If the battery frame is rigid there will be less and a more even wear to the stem, shoe and die; and less power required to do the work. A battery frame of steel is better than one of wood, if constructed so as to have a minimum of vibration, which will insure its own life and that of the stems, by holding the guides firmly and always in alignment. The enormous production of steel and the improved railroad facilities, together with the increase in price of timber, have made it possible in many localities to lay down steel as cheaply, if not more cheaply, than timber.

The accompanying drawing shows the wooden cantilever battery frame and ore-bin. This is designed for districts where timber is plentiful and when time is limited.

A 10-stamp mill of this design, of steel construction, has just been erected at Tonopah, Nevada. It has foundations and battery frame for 20 stamps, but so far only 10 have been installed. The battery and ore-bin frames, the pan frame, and building are all made of steel, and the foundations and floors are concrete. The object was to do away with the future replacing of timbers, to give guides and bearings rigid support; the cement floors were put in to prevent loss of quicksilver.

The battery frame is a part of the ore-bin from which it gets its rigidity. Two concrete walls 30 in. thick are the foundations for a series of 24-in. I-beams having 5.5-ft. centers. These beams extend out so as to take the bearings for the cam-shaft. The skeleton of the bin is of 10-in. I-beams and the 10 in. cap-channels are a support for a hanging strap, which catches the base beam near the cam-shaft bearing, giving that bearing an extra support. This construction leaves a clear passage about the two five-stamp mortars which are of the double discharge and low type.

The lower guides are placed so low that when the stamp is at its highest point with new shoe and a new die, the top of the stamp-head nearly touches the bottom of the guide. The housing is around the stamp-head instead of

enclosing the stem; also the stamp-head is reached more handily in 'backing off' the head. The sides and bottom of the ore-bin are of re-enforced concrete arched. The ends of the bin are concrete walls, the bin and battery occupy a minimum of space.

The Tonopah mill consists of ten 1,300-lb. stamps; the guides are individual, of cast iron and 15 in. long. The pulp is crushed wet, put through a coarse screen and piped to two 5-ft. Huntington mills, used as re-grinders. From these mills it is taken to a series of continuous pans and settlers. The pan frame is steel and the pans are overhead driven, doing away with the noisy gears which are usually placed in a dark and inconvenient pit.

The cams, tappets, shoes and dies are of chrome steel. The cams are self-tightening, as is also the cam-shaft pulley. A unique detail of the mill is a contrivance for hanging up the stems. Cast-iron fingers with adjustable steel caps are mounted on a 4-in. shaft; a lever for each finger passes between the stems and projects in a handy position, so that by simply pulling down the lever with one hand, the tappet is lifted out of the way of the cam. Lifting the lever puts it at work again, and it is all done from in front of the mortar where one wants it.

The concrete foundation under the battery is 6 ft. deep and 7 ft. wide. The proportion of cement and sand was varied. The first 2 ft. were mixed, 6 of sand to 1 of cement; the second 2 ft., 5 of sand to 1 of cement; the next foot, 4 of sand to 1 of cement, and the last foot and also the mortar block (which stands up 12 in.) was mixed 3 of sand to 1 of cement. It was built on a good rock foundation, and the rock used in the concrete was firm and clean, the pieces being placed as close to each other as possible, while allowing the wet cement and sand to imbed each piece separately. The tamping of concrete is very important and also the mixing. It should be tamped until the water is drawn to the surface. In mixing a given amount of sand, generally measured by filling barrels and leveling off, it should be spread in a layer 4 or 5 inches thick on a mixing platform. The measured quantity of cement should be evenly distributed over this. The piles should then be turned over several times until thoroughly mixed; then it should be wetted down. The mortar-block should be left one inch low, and when the mortar is placed in position it is set 0.25 in. low and then grouted up with cement and sand mixed in the proportions of two to one. Then, when the concrete is sufficiently set the mortar is raised; a sheet of rubber, 0.25 in. thick, is placed on top of the mortar-block and all is finished. This gives a block which will last a lifetime. Sand for the concrete should be perfectly clean; and if it is not, it should be washed. A very small quantity of lime added to concrete in the mixing will be found to give it additional strength.

The stamps drop 100 times per minute, and have a capacity of between five and six tons per stamp. The mill-building is all steel and galvanized corrugated iron with plenty of windows. Power is furnished by a 120-h. p. Diesel oil engine. The mill is lighted throughout by electricity. All driving pulleys have friction clutches which permits of any one part being cut out without shutting down. The retorting is also done with oil for fuel. Owing to the high freight rates over the 60 miles of desert, wood and coal were out of the question. In a quartz-mill no power is as satisfactory as steam.

The mill was contracted for by Harron, Rickard & McCone, of San Francisco. It was planned by Mr. M. P. Boss and constructed by the writer. The plant is running splendidly and saving a high percentage at a low cost.

RECENT LITERATURE ON ECONOMIC GEOLOGY. IV—SALT, GYPSUM AND BORAX.

BY EDWIN C. ECKEL.

The Saline Deposits of California. By G. E. Bailey. *Bulletin* 24, California State Mining Bureau, pp. 216, maps, 5.

This monograph deals with the geological, topographical and chemical features of the Great Basin; the borate, the carbonate, the chloride, and the nitrate salts. Besides numerous plates it contains a relief map of California, a map showing distribution of the salines, and a township map of southern California, showing distribution of saline deposits.

With the exception of common salt, which is made by evaporating ocean water, the saline deposits of California occur within the limits of the Great Basin. This area is characterized by arid climate, by drainage systems that are largely without outlet, and by interrupted monoclinal mountains. Relatively small portions of the area are below sea-level. Aridity of climate has occurred periodically in the Great Basin. The combination of earth movements and a centripetal drainage have resulted in forming fresh-water lakes, while aridity has led to the evaporation of these lakes and the deposition of their saline ingredients. Deposits of gypsum, common salt, soda, Glauber's salt, etc., are due to this process. Nitrate deposits, on the other hand, result from it only indirectly; they are probably due to oxidation of organic matter, the presence of alkali in the soil being favorable; their accumulation is due to the climatic conditions.

The saline deposits are described in detail by Mr. Bailey, and valuable notes on the technology of the products are added.

Reconnaissance of the Borax Deposits of Death Valley and Mohave Desert. By M. R. Campbell. *Bulletin* 200, United States Geological Survey. pp. 22, map.

The borax industry, as first established in this district, was based on the occurrence of crusts of borax in the neighborhood of marshes. Later it was discovered that these crusts were of secondary origin, being derived from the leaching of borax beds contained in a series of lake sediments of Tertiary age. A reconnaissance of these lake beds was made, and the results are shown on the map and in the text of this bulletin. The occurrence of a large salt bed, in Death Valley, is also noted.

Salt and Gypsum Deposits of Southwestern Virginia. By E. C. Eckel. *Bulletin* 213, United States Geological Survey. pp. 406-416.

Thick deposits of gypsum and rock-salt occur in Smyth and Washington counties, Virginia, in the valley of the North Fork of Holston river; they appear to be of Lower Carboniferous age, immediately underlying the Greenbrier limestone. Both salt and gypsum are of exceptional purity.

No rock-salt is mined, but the brine is utilized at Saltville, Va., for the manufacture of salt and alkali. Lack of railroads has retarded the development of the gypsum deposits, but one large plaster plant is in operation at Plasterco, near Saltville. Attempts have been made to manufacture Keene's cement. The report contains data on the manufacture of this product, as well as on the salt and gypsum deposits and the plaster industry.

Deposits of Hydroborate of Lime; Its Exploitation and Refination. By C. A. L. Hoskold. *Transactions* American Institute Mining Engineers. Vol. XXIII., pp. 456-471.

Contains brief sketches of the occurrence of borax minerals in Argentine, Chile, Peru, Bolivia and the United States; with notes on refining processes and detailed data on cost of extracting and refining.

The South American deposits contain mineral carrying from 38 to 46 per cent boric acid, with 35 per cent water. It is shown that such material can not be shipped to England at a profit unless it is calcined at the mines, to remove the water; but that the shipment of calcined material is profitable. Refining on the spot is impracticable, because no pyrite deposits occur near the borax; and the sulphuric acid necessary would therefore have to be brought from the coast. A small refinery, however, is in operation near Buenos Ayres.

Geology of Webster County (Iowa). By F. A. Wilder. Iowa Geological Survey. Vol. XII. pp. 63-235.

An important gypsum deposit, from 10 to 30 ft. thick, occurs near Fort Dodge, Iowa. The beds are underlain unconformably by Carboniferous rocks; and from this circumstance and the lithological character of the associated rocks, the gypsum-bearing series is considered to be of Permian age.

The deposits are discussed in detail, and several modes of origin are considered, the author's decision being that the gypsum was derived from the partial isolation (with consequent evaporation) of ocean water in a basin similar to that of the Mediterranean.

The large and developing plaster industry of the district is described; and an interesting series of tests of plasters, by Professor Marston, is included and discussed. A lengthy discussion of the plaster industry of Germany, containing descriptions of products and processes little known in America, is also presented.

BOOKS REVIEWED.

Mineral and Crown Land Grants in Nova Scotia. By Edwin Gilpin, Jr. Reprinted from the Transactions of the Royal Society of Canada. Ottawa, 1903; J. Hope & Sons. Pages, 12.

The pamphlet contains a brief historical résumé of the grants of mineral and crown lands in Nova Scotia. It includes an index showing the various minerals for which grants were made, and indicating the records wherein they are mentioned.

Bulletin du Service de la Carte Géologique de l'Algérie. No. 3, Le Djebel Amour et les Monts des Oulad-Nayl. By Etienne Ritter. Algiers, 1902; published for the Government of Algeria. Pages, 100; with maps.

This is one of a series of bulletins, describing the geology of Algeria, that are issued from time to time by the Geological Survey of that country. The present report deals with the stratigraphy of the Saharan Atlas region

in southern Algeria, which is characterized by a great variety of topographic and geological features.

New York State Museum, Bulletin 61. *Quarries of Bluestone and Other Sandstones in the Upper Devonian of New York State.* By Harold T. Dickinson. Albany, 1903; University of the State of New York. Pages, 112; illustrated. Price, 35c.

This bulletin is uniform in general character with the preceding publications of the New York State Museum on the economic geology of New York. It contains a description of the geological features of the districts in which the sandstones are quarried, and various details relating to the methods of quarrying and marketing the stone. Mention is made of all quarries that have been opened and are under operation. The present bulletin is the first of a series to be issued from time to time in the future which will discuss the resources of New York State in various kinds of building stone.

CORRESPONDENCE.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.

Letters should be addressed to the EDITOR.

We do not hold ourselves responsible for the opinions expressed by correspondents.

The Salpo Mining District, Peru.

Sir.—As the greater part of the best mining properties in the central regions of Peru—those of Yauli, Chuquitambo, Morococha and Cerro de Pasco—have passed into the hands of an American syndicate, the attention of both native and foreign capitalists is now directed principally to the rich mining districts in the north and south of the Republic, where mines are at present almost stationary, and, in some cases, unworked, for want of capital.

The Salpo mining district is a case in point. The rich mines in this region were discovered toward the close of the eighteenth century, and before long they were rivals of the then celebrated mines of Potosi and Cerro de Pasco.

For fifty years these mines were worked with splendid results. Some of the mines had been worked to a depth of 300 ft.; but the miners who worked them, partly owing to their deficient experience and partly from the want of proper machinery, were unable to get rid of the water which invaded the mines. Besides this, the disturbed state of the country after the proclamation of its independence led to the gradual abandonment, by those interested, of all the mining properties in this district, so that what was at one time a rich and prosperous locality became little better than a desert. For several years things remained in this condition, until Mr. Salas, at present one of the largest mine-owners in Salpo, determined to start working.

In accordance with the plans suggested by Mr. Lastarria, an adit was commenced in 1868 at a considerably lower level than the previous workings. In 1878 this adit had reached a distance of 600 meters, and only a little more was required for its conclusion, when the war with Chile broke out. The result was that all the laborers in the mines had to leave their work. This state of things lasted until 1886. At this time Mr. Salas, who was then already an old man, had devoted his attention and energy to other matters.

These mines are situated in the department of La Libertad, in the north of Peru, at a distance of about 50 miles from the seaport of Trujillo. There is a cart-road for about half of the distance between Trujillo and the mines. At 12 miles from the mines lies the city of Otuzco, capital of the province. The mines are about 11,000 ft. above the level of the sea, and are surrounded by agricultural property in a good state of cultivation.

Near them is a small stream, and six miles distant a river which runs into the sea at Trujillo. Along the course of this river there are several establishments for crushing ores, but these are all closed. There is water and fall enough to obtain any amount of power which may be required.

The vein, or lode, existing in the Salpo mines is visible for several miles; its width varies. The ores are, on the surface, oxides of iron, with silver, and these, in depth, become sulphates of silver and of lead. At 150 to 180 ft. the ores carry gold and silver, their grade varying from 40 up to 1,600 oz. silver per ton. Besides the principal vein, there are many others, which cross it, and in some of these crossings some rich pockets have already been discovered.

About 500 m. from the Salpo, in an easterly direction, and at about 540 ft. lower down, there is another vein called the Milhuachaqui, which also carries gold and silver; but the greater part of the workings are full of water.

No mine has hitherto been worked at a depth of over 300 ft. At a distance of 24 miles from the Salpo mines there is an abundant supply of coal, which is used locally for mining, industrial and domestic purposes.

There are several cities, towns and villages in the neighborhood of these mines, and there is no difficulty in obtaining labor.

The mines could probably be acquired at a reasonable price.

Two English mining engineers have lately been visiting these and other mines near Pataz, for account of an English syndicate.

G. R. G.

Lima, Peru, Dec. 15, 1903.

ABSTRACTS OF OFFICIAL REPORTS.

Rhode Island Copper Company.

This company is engaged in developing a copper property in the Lake Superior district. The report is for the year ending December 31, 1903. The financial statement shows that the balance on hand, January 1, was $78,104; receipts from interest and assessments were $14,956; from sales of copper, $2,752; a total of $95,812; expenses were $28,988, leaving a balance of $66,824 at the close of the year.

No. 2 shaft, the deepest on this property, through which most of the exploration was conducted, is now down 1,000 ft. The work done during the year included 244 ft. winze sinking, 1,062 ft. drifting and 250 ft. crosscutting. The stoping done amounted to 57 cu. fathoms. The first shipment from the mine was made in November; it consisted of 31,611 lb. mass and barrel copper, and was treated at the Quincy smelting works. About two-thirds of this amount, besides a quantity of stamp-rock, was taken from the West lode.

The report says that the work done during the year was in part discouraging and in part encouraging. The development was chiefly at the West lode and the Albany & Boston conglomerate, but the results were sufficiently good to encourage other work. Most of the openings made were on the eighth level, at a depth of 1,000 ft from the surface. A cross-cut driven from the West lode to the Albany & Boston opened up two amygdaloid lodes, hitherto unknown, one of which carried some copper. It is recommended that No. 2 shaft be sunk further for the purpose of exploring the lodes, which seem promising.

American Iron and Steel Manufacturing Company.

This company owns manufacturing plants at Reading and Lebanon, Pa. The report is for the year ending December 31, 1903. The statement of assets and liabilities is as follows:

Accounts receivable	$639,618
Cash	191,017
Charter and organization account	24,896
Inventory, Dec. 31, at cost prices	954,817
Real estate, plants and equipment	4,573,345
Total assets	$6,383,693
Preferred stock	$3,000,000
Common stock	1,700,000
Current liabilities	939,489
Reserve fund, to provide for depreciation	500,000
Undivided profits	244,204
Total liabilities	$6,383,693

The report of President J. H. Sternbergh says: "In connection with our financial statement, we beg to report an active and fairly prosperous condition of your company's business during the first half of the year 1903, with decreased demand and rapidly falling prices and unusually sharp competition during the latter part of the year. We have paid the regular quarterly dividends on our preferred stock, besides paying $251,492 for renewals and maintenance of buildings and machinery, and $262,749 for betterments and extensions, and in addition have absorbed the shrinkage in the value of raw materials and finished goods, in itself a large sum. It is gratifying to report that the goods we manufacture are of the highest standard, both in quality and finish, and are so recognized generally by our customers throughout the whole country."

Quincy Mining Company.

This company owns one of the larger copper mines in the Lake Superior district in Michigan. The report is for the year ending December 31, 1903. The refined copper turned out during the year was 18,498,288 lb. The earnings and expenses for the year, with the averages per pound of copper, were as follows:

	Amount.	Per lb., Copper.
Sales of copper	$2,447,352	13.23
Interest, etc.	17,804	0.10
Total earnings	$2,465,156	13.33
Mine expenses	$1,573,863	8.51
Taxes in Michigan	59,406	0.32
Smelting, transportation, etc.	175,186	0.95
Construction cost	117,775	0.64
Total expenses	$1,926,230	10.42
Net income	$538,926	2.91

The balance brought forward from 1902 was $880,360, making a total of $1,419,286. Dividends paid were $550,000, or $5.50 per share, leaving a balance of $869,286 at the close of the year. From this a dividend of $2.50 per

share, or $250,000 in all, has been declared, payable February 25, 1904.

The total rock mined was 1,024,164 tons; rock hoisted, 1,006,173 tons; stamp-rock treated, 958,935 tons. The yield of mineral from rock-houses was 4,060,435 lb.; from stamp-mill, 21,159,785 lb.; total, 25,220,220 lb. The refined copper obtained from this mineral was 18,498,288 lb. The average yield was 443 lb. mineral, or 325 lb. refined copper, per fathom of ground broken. The yield of refined copper was 19.29 lb. per ton of rock stamped, or 0.9645 per cent.

The number of men employed was 1,624, of whom 586 were miners. The average wages of miners on contract were $62 per month.

The usual amount of exploration work was done during the year, with fair results.

The report of Capt. J. L. Harris, superintendent, says: "As most of the available stoping ground, of any value, in the vicinity of No. 4 shaft, will soon be exhausted, it will be advisable to discontinue work there in the near future. Most of the mine water, that accumulates below the lake level, is piped to a reservoir at the bottom of this shaft and hoisted to surface. In order to take care of the water when No. 4 is abandoned, sumps were constructed at the 59th level, No. 2 shaft, and at the 56th levels, Nos. 6 and 7 shafts respectively of, approximately, 50,000 gal. capacity each. Suitable skips for hoisting water, of 1,300 gal. capacity each, have been constructed, to be placed in commission at these shafts, when required.

"Our most important underground construction work during the year was in connection with the bins for the storage of rock, and our electric haulage system. Bins were constructed at 13 points. All of these bins are now in commission, and, in conjunction with the eight-ton skips and electric haulage, place us in a position to handle 1,200 tons of rock in each shaft every 24 hours, besides the hoisting and lowering of men, handling of all timber and other underground supplies.

"At the 57th level, north of No. 2 shaft, a 100-kw. compound wound, direct current generator, purchased from the General Electric Company, was installed, necessary wiring from sub-station at the surface to same, and wiring of the most productive levels for operating electric lomotives, completed. This new generator went into commission the latter part of the year and we are, at present, operating 15 electric locomotives throughout the lower portion of the mine.

"During the year the diamond drill was used in several different places throughout the mine, and an aggregate depth of 1,705 ft. was bored, but nothing of value was discovered. During the summer it became necessary to remove both compressors and rebuild foundations at our No. 2 compressor plant. By removing one foundation at a time and operating the other compressor in conjunction with the old auxiliary compressors at No. 4 plant, a sufficient quantity of air was furnished for operating our full complement of underground machines. This reconstruction work was completed in the early fall, and both compressors are now giving excellent service. The foundation of No. 7 hoist will, undoubtedly, require attention at an early date, when it will be necessary to discontinue hoisting in this shaft until the necessary reconstruction work is completed.

"Several changes were made in the rock-houses, in order to facilitate the treating of extra quantities of rock. Electric motors were installed in the smith-shop, drill-shop, carpenter-shop and roundhouse, in lieu of the small steam engines, for driving the shafting. At the stamp-mills, most of the several important changes and improvements inaugurated last year, toward reducing the cost of stamping, and the saving of copper in the waste tailings, were practically completed. At No. 2 mill, four 'Standard' concentrators were installed for treaing the slimes in connection with the Wilfley tables. The principal changes made were at No. 1 mill. The five Allis two-way mortar heads were changed to the coarse stamping system, thus materially increasing the capacity of each head. Forty extra roughing jigs and 30 finishing jigs were installed; the latter jigs to treat material in combination with the Wilfley tables, instead of on the tables alone, as heretofore. A trolley system was completed for handling the mineral, which is done with less labor and greater dispatch than is possible under the old method. A similar system will be introduced in No. 2 mill.

"As mentioned in previous report, our intention is to use cars, instead of barrels, for the more economical handling and transportation of the mineral from our stamp-mills to smelting works, where a suitable mineral-house for the temporary storage of mineral will be erected. On account of the various improvements under way during the year at stamp-mills, and some contemplated changes at our smelting works, it was decided to defer this work for the time being, but we expect that the new system will go into effect this coming year.

"A private telephone system was installed, connecting the principal buildings at mine and stamp mill."

QUESTIONS AND ANSWERS.

Queries should relate to matters within our special province, such as mining, metallurgy, chemistry, geology, etc.; preference will be given to topics which seem to be of interest to others besides the inquirer. We cannot give professional advice, which should be obtained from a consulting expert, nor can we give advice about mining companies or mining stock. Brief replies to questions will be welcomed from correspondents. While names will not be published, all inquirers must send their names and addresses. Preference will, of course, always be given to questions submitted by subscribers.

Sodium-Magnesium Sulphate.—I would like to get some information in regard to the nature and possible uses of a mineral substance which is new to the trade. The substance has approximately the following composition: MgO, 11.80 per cent; Na_2O, 17.87 per cent; CaO, 2.85 per cent; SO_3, 46.67 per cent; H_2O, 19.82 per cent. It can be supplied in large quantities, and, I believe, could be employed in the production of magnesium salts and for metallurgical purposes.—B.

Answer.—The substance is evidently a hydrated double sulphate of sodium and magnesium and resembles closely in chemical composition the mineral blöclite ($MgSO, Na_2SO_4 + 4H_2O$). It might be employed in the preparation of the salts of sodium and magnesium, but we know of no uses in metallurgy to which it could be applied.

Hydraulic Mining.—A hydraulic mine is to be worked by an artificial head, raising steam by means of wood fuel. The pump is to be a three-stage centrifugal, which will draw the water from a creek and force it to the giant, 1,500 ft. distant and 35 ft. above water-level. The delivery expected is 1,050 gal. per minute under a total pump pressure of 65 lb. per sq. in., equivalent to 150 ft. of water head, and a net pressure, at discharge, of 43 lb. per sq. in., or 100 ft. of head. Owing to lack of grade, the gravel must be raised 15 ft. vertically. Under the conditions specified, which of the two following plans is likely to be most economical and practical: (a) to install a second steam pumping outfit with a special gravel centrifugal lifting the wash from a sump; or (b) to use a hydraulic elevator, taking the necessary water from that supplied by the three-stage centrifugal under 100 ft. head?—F.

Answer.—This is a question that can be answered only after a careful study of the local conditions. The advisability of installing a second plant would depend upon the size of the gravel deposit and other factors which you do not give. We would advise you to secure the services of an experienced engineer.

RECENT DECISIONS AFFECTING THE MINING INDUSTRY.

SPECIALLY REPORTED.

DUTY ON BORACIC ACID.—An antiseptic preservative, consisting of an intimate mechanical mixture of boracic acid and borax, the former being the component of chief value, is not an article enumerated in the tariff act of July 24, 1897, either under paragraph one as 'boracic acid,' under paragraph three as 'chemical compounds,' or under paragraph 11 as 'borax' or 'borate material'; but is dutiable at the same rate as boracic acid under said paragraph one by virtue of the provision in section seven of said act that "on articles not enumerated, manufactured of two or more materials, the duty shall be assessed at the highest rate at which the same would be chargeable if composed wholly of the component material thereof of chief value."—Appeal of Berth Levi & Co.; United States Circuit Court, Southern District of New York.

LIABILITY OF LESSEE WHEN THERE IS NO ORE.—Where a mining lease gave the lessees the right to mine all iron ore under certain land designated for the period of ten years, for which they agreed to pay the lessor a royalty of 15c. per ton of ore mined, the lessees binding themselves not to mine less than 100 tons a month, such lease contained an implied covenant that the land contained minerals, and no ore having been found in paying quantities, the lessees were not bound to pay royalties under same.—Brooks v. Cook (34 *Southern Reporter*, 960); Supreme Court of Alabama.

DUTY ON BORT.—On trial for forfeiture of certain diamonds of an inferior quality and of the variety commonly called bort, which had been advanced in condition by being drilled, the disposition of the case turned on whether the articles were included in paragraph 545, tariff act of July 24, 1897, relating to "diamonds . . . not advanced in condition, . . . including . . . bort." *Held* that the terms of limitation following the provision for 'diamonds' do not relate to the provision for 'bort,' and that the merchandise was accordingly free of duty.—United States v. Fifteen

Drilled Diamonds; United States District Court, District of Connecticut.

DUTY ON JADE.—Articles manufactured from jade, consisting of tableware, ornaments and other completed articles, are dutiable under paragraph 97, tariff act of July 24, 1897, relating to "articles and wares composed wholly or in chief value of . . . mineral substances," and not under paragraph 435 of said act as "precious stones advanced in condition or value from their natural state," nor under section six as unenumerated articles.—Appeal of C. L. Tiffany & Company; United States Circuit Court, Southern District of New York.

PATENTS RELATING TO MINING AND METALLURGY.

UNITED STATES.

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by the ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared.

Week Ending March 1, 1904.

753,246. FUEL.—Henry R. Dorr, Rutland, Vt. Fuel composed of bituminous dust, anthracite dust, cement, and common salt.

753,249. APPARATUS FOR THE MANUFACTURE OF CONCRETE BRICKS, ETC.—Lee J. Dumm, Columbus, Ohio. Combination of a relatively stationary grid, a series of partitions movable through the grid to form molds and a removable grid provided with knives to subdivide the material in the molds.

753,257. TRIPLE-HOPPER COKE-CAR.—John M. Hansen, Pittsburg, Pa. In a hopper-bottom car, the combination with a center and side sills, of a diaphragm extending from the center sill to the side sills and secured to both, of inclined hopper-plates provided with flanges at their upper edges resting on and secured to the diaphragm, a cross-connection plate extending over the center sills and also secured to the diaphragm, and doors secured to the lower edges of the inclined plates.

753,269. STONE-SAWING MACHINE.—George D. Hunter, Bloomington, Ind. In combination with a casting having a vertical opening, a non-rotatable interiorly-threaded sleeve removably inserted into the casting from one end thereof, and transversely movable therein in operation, and means at said end for retaining the sleeve in place, the opposite end of the sleeve being free.

753,270. STONE-SAWING MACHINE.—George D. Hunter, Bloomington, Ind. In a gang-saw stone-cutting machine, a saw-gang frame, a noddle-pin suitably supported by and journaled at its ends, flanges fixedly secured to the pin intermediate its bearings and connections between the pin and a moving part arranged between the flanges.

753,282. EXCAVATING AND LOADING MACHINE.—Daniel H. Mahoney, Vincinnes, Ind. The machine consists of a carrier, a boom, a scoop carried by the boom, means for raising and lowering the boom, and an inclined guide for the movement of the boom, said guide being formed of foldable sections.

753,286. BUILDING BLOCK.—James D. Morrison, Reinbeck, Iowa. A building-block consisting of two quadrangular parts of uniform length and straight-faced at their ends and an integral part that connects the two parts at their central portions and each of the three parts provided with a chamber in its under side.

753,293. COOLING-RACK FOR BARS.—George G. McMurtry, New York, N. Y., assignor to American Sheet Steel Co., Pittsburg, Pa., a corporation of New Jersey. A cooling-rack comprising a wheel having a plurality of series of radial projections, the projections of the several series being in line with each other, gearing for rotating the wheel, and a power-motor for intermittently actuating the gearing.

753,294. METHOD OF PRODUCING GAS.—Paul Naef, New York, N. Y. The method containing illuminating-hydrocarbons from bituminous fuel, consists in first coking the fuel by continuously conducting heated water-gas through the same, second, removing by-products from the resultant gases, third, heating the water-gas and utilizing it in the first operation.

753,295. METHOD OF MAKING GAS.—Paul Naef, New York, N. Y. The method of producing water-gas and by-products from bituminous fuel, which consists in injecting steam into a portion of a moving body of fuel, withdrawing the reaction products, re-heating them and passing them through another portion of the moving body of fuel.

753,296. APPARATUS FOR MAKING GAS.—Paul Naef, New York, N. Y. The combination of several generators, means to pass fuel into and through each generator, means for heating a gaseous fluid and means to pass the heated gaseous fluid at suitable temperature through each of the generators successively.

753,303. MOLD FOR CEMENT BLOCKS.—Warren G. Park, Avon, Ill. The combination with a mold having its walls composed of separable parts, of a plurality of ribs associated with and wholly surrounding the inner face of the mold circumferentially thereof, a member extending longitudinally through the mold with its ends disposed centrally of one of the ribs, and a member extending transversely of the mold with its ends disposed centrally of another of the ribs.

753,319. WELL-DRILLING MACHINE.—Delbert W. Saunders, Maquoketa, Iowa. In a well-drilling machine, a vertically-pivoted frame revoluble in a horizontal plane, means for imparting a step-by-step rotative movement thereto, a winding-drum carried by the frame, a drill-rope connected to the winding-drum and having a guiding means supported by the frame, a drill supported by the drill-rope, and means operable by downward movement of the drill for permitting release of the winding-drum to feed the drill.

753,340. GAS-PRODUCER.—James M. Wight and Harry Hyatt, Cleveland, Ohio. In a gas-producer, the combination with a chamber, and a rotary conical grate therein, of a coal-feeding tube in the chamber above the grate, and means carried at the apex of the grate to feed the coal from the tube.

753,375. WELDING APPARATUS.—Hugo Dicke, Frankfort-on-the-Main, Germany, assignor to Jacob Eduard Goldschmid, Frankfort-on-the-Main, Germany. In an apparatus for locally heating metal for welding purposes, the combination of a head provided with air and gas conduits, walls of refractory material supported in the head, and constituting a heating-chamber, the walls enveloping and confining the parts to be heated, air and gas mixing conduit terminating in burner-orifices in the walls, and conduits between the article to be heated and the adjacent walls to direct the escaping products of combustion against the metal.

753,377. MACHINE FOR MOLDING BUILDING BLOCKS OR STONES.—Wallace L. Dow, Sioux Falls, S. D., assignor, by direct and mesne assignments, to Miracle Pressed Stone Company, a Corporation of South Dakota. In a machine for molding building-blocks, a die or mold form comprising, in combination with a fixed supporting-base having rigid with it cores for forming the cavities in the block, a platen bottom plate having apertures to correspond with the cores; two opposite lateral walls pivoted with respect to the base at a distance from the mold-cavity, and having beads forming exterior stops within which the other two opposite lateral walls are lodged, and means for clamping the two pivoted walls together onto the ends of the other two walls.

753,385. PROCESS OF MATURING PORTLAND OR OTHER HYDRAULIC CEMENTS. Henry A. Gerdes, Minneapolis, Minn., assignor of fifty-five one-hundredths to F. W. Cappelen, Arthur H. Elftman, and James B. Cull, Minneapolis, Minn. In the process of maturing Portland and other hydraulic cements, the subjecting them to a heat of 360° F. and to a current of air charged with moisture and carbonic acid.

753,407. COMPOSITION OF MATTER.—William Lenderoth, New York, N. Y. As a new article of manufacture a hard homogeneous molded fused mass or composition of matter composed of shale and serpentine rock, which can be produced by melting the ingredients by heat and then molding the same into required shape.

753,408. ROLLING-MILL.—David H. Lentz, Joliet, Ill. In a rolling-mill, the combination with a pair of rolls between which a rail may be grasped and fed, the rolls being placed in substantial alinement, of a third roll acting upon the rail at right angles to the aforesaid rolls and engaging one side of the rail, an abutment engaging the other side of the rail, the abutment being in the form of a bar, and means whereby the bar may be caused to travel as the rail is passed through the rolls.

753,409. PROCESS OF RENEWING TRACTION-RAILS.—David H. Lentz, Joliet, Ill. The process of changing the form of a traction-rail, which consists in heating the rail to a suitable temperature and reshaping a head thereof into a flange by subjecting the metal thereof simultaneously to transverse and to longitudinal compression.

753,440. COAL SEPARATOR AND WASHER.—Harry M. Spencer, Dunmore, Pa. The combination with a substantially vertical shaft, of a series of superposed outwardly-sloping conical screens secured upon shaft, the screens being disposed at gradually-increasing inclinations and having openings therein of gradually-decreasing diameter, and separate device for receiving the material passing over the edges of the several screens.

753,447. ACETYLENE-GAS GENERATOR.—Christopher Tatters and John Tatters, Eaglelake, Tex. A tank, an inverted gas holder movable vertically in the tank, upwardly-extending guides upon tank, means upon the gas-holder engaging the guides, a valved feed-pipe extending upwardly from the gas-holder and supporting a carbide reservoir, an operating-arm extending outwardly from the valve, a standard rising from the water-tank and having a T-shaped slot near the upper end thereof for the reception of the valve-operating arm, and a notched slide pivotally connected with the upper end of the standard and adapted to close the side opening of the T-shaped slot to confine the valve-operating arm in the latter.

753,465. COPPER-POURING SPOON.—Benjamin H. Bennetts, Tacoma, Wash. In a copper-pouring spoon, the combination of a horizontal receiving-bowl intermediate between the converter and the molds, a U-shaped supporter engaging and supporting the bowl, and a horizontally-jointed arm secured to and carrying the supporter in such manner that the bowl may be moved in any direction in the horizontal plane.

753,477. MACHINE FOR EXCAVATING ROCK.—Chester T. Drake, Chicago, Ill. Combination with a support, of a column-bar pivoted thereon, means located between the support and the free end of the column-bar for concentrically adjusting the position of the column-bar with respect to a given center and means for rigidly securing the same in an adjusted position.

753,482. CONVEYOR.—Mason Foshee, Chapman, Ala. A conveyor comprising a roller-bed, standards, upper sheaves mounted on the standards, a conduit located beneath the roller-bed, lower sheaves journaled in the conduit, a flexible transmitter carried by the upper and lower sheaves, a drum with which the ends of the flexible transmitter are connected, means for rotating the drum, and a connection having means at one end for engaging the flexible transmitter and means at the other end for engaging the object to be conveyed.

753,491. BUILDING-BLOCK.—Addison F. Hoffman, Pittsburg, Pa. A building-block having its outer face provided with intersecting grooves, and cement filling the grooves and terminating short of the outer face of the block.

753,506. DUMP-CAR.—Otto W. Meissner, Chicago, Ill., assignor to Rodger Ballast Car Company, Chicago, Ill., a corporation of Illinois. In a convertible dump-car, the combination of a supporting-framework, a V-shaped hopper extending lengthwise of the car and formed in two portions—a lower portion and an upper foldable portion arranged to be folded into a flat plane and complete the floor of a gondola car or opened to complete the inclined sides of a hopper-car, and side boards pivotally secured to the framework of the car to form the sides of either a gondola or hopper car in one position and to be swung to a second position to convert the car into a platform-car.

753,537. APPARATUS FOR GRINDING OR

CRUSHING.—Thomas Breakell, Wirksworth, near Derby, England. In combination, a mortar, a base-plate adapted to receive mortar, a column rigidly attached to the base-plate, a bracket carried by the column, a block provided with a spindle which is adapted to rotate in a horizontal hole in the bracket, a sleeve pivoted to the block so as to be capable of oscilating about a horizontal axis perpendicular to the axis of the spindle and a pestle provided with a stem adapted to rotate and to slide within the sleeve.

753,592. SEPARATOR.—Arthur Langerfeld, Scranton, Pa. In a separator for lump material, a declivous slide, one or more separating-partitions at the lower end of the slide, devices for ranging the material in single-piece files, spaced laterally apart from each other at such distances as to preclude contact on the slide between the pieces from adjacent files, and means for delivering the pieces of material separately from the files onto the slide.

753,602. STAMP-MILL.—William A. Merralls, San Francisco, Cal. A stamp-mill mortar having openings on all four sides, screens in three of openings, and a removable amalgamating-plate closing the fourth opening and coextensive in size with the screens, the plate having horizontal troughs or riffles for catching the precious metal.

753,603. STEEL-CONCRETE CONSTRUCTION, ETC.—John S. Metcalf, Chicago, Ill., assignor to John S. Metcalf Co., Chicago, Ill., a corporation of Illinois. This construction consists of a stay comprising sections formed with adjacent hook-equipped extremities, a link engaged by the hooks, and means at each link forming a part of the stay for forcing the hooks into close engagement with the link.

753,616. CONVEYOR OR CHUTE FOR INFILLING MATERIAL.—Thomas Nicholson, Chicago, Ill. Combination of a sectional conduit or tube having its sections detachably connected together and when connected having the entering ends of the sections interlocked one with the other, means for suspending the conduit or tube to hang free, and means for connecting each section independently and detachably to the suspending means.

753,624. DRYING AND CALCINING KILN.—Charles E. Pickett, Bayonne, N. J. In a kiln, the combination of an outer cylinder and an inner cylinder, a smoke-box at one end of the cylinders, a chimney extending from the box, a conveyor leading to the inside of the inner cylinder, a hopper with piping leading to the conveyor, a casing for the conveyor and a vapor-escape pipe leading from the casing, means to rotate the conveyor, means to rotate the cylinders, and means to heat the annular space between the cylinders.

753,632. ACETYLENE-GAS GENERATOR.—Edwin M. Rosenbluth, Philadelphia, Pa. In an acetylene-gas-generating lamp, the combination with a casing comprising a flame-chamber inclosing a burner; of a water-receptacle supported by the casing; and a plurality of separate carbid-containing receptacles removably supported by the casing respectively above and below the water-receptacle.

753,633. GOVERNOR FOR AIR-COMPRESSORS.—Henry Saam, Mohawk, Mich. In an air-governor for air-compressors, the combination with a cylinder communicating with an air-supply and piston therein, of a lever, a connection between the lever and a mator-governor, a second lever connected to the piston, and a cam-block forming a connection between the two levers whereby as the piston shifts the ratio of leverage will change.

753,673. APPARATUS FOR FEEDING FINE FUEL AND AIR TO FURNACES.—Alfred E. Creigh, Ronceverte, W. Va. This furnace attachment, comprises fuel and air conducting pipes, a fan-blower for producing exhaust, an oscillating connected fuel-discharge pipe operatively connected with the blower and provided with nozzles projecting into the furnace-chamber, and means for operating the blower and oscillating the discharge-pipe. simultaneously.

753,688. MACHINE FOR SAWING MINING-TIMBERS.—Daniel W. Edwards, Chicago, Ill., assignor to Greenlee Brothers & Company, Chicago, Ill., a corporation of Illinois. In a timber-dressing machine, a main frame, a chuck adapted to grip a timber, and mounted to reciprocate upon the frame, automatic mechanism for rotating the chuck upon an axis concentric with the longitudinal axis of the timber gripped thereby and through an angular distance of 90° and during the reciprocatory travel of the chuck, and rotary cutting-tools supported in the path of the timber carried by the reciprocating chuck and operating upon each passage of the carriage thereby to cut away the end portion of the timber to produce one-half of a tenon having a straight side parallel with the longitudinal axis of the timber, and a contiguous shoulder beveled at an angle of 45° from the plane of the flat side of the tenon.

753,691. ACETYLENE-GAS GENERATOR.—John M. Flugstad and Peter M. Flugstad, Corvallis, Mont. Combination of a generator vessel, a carbide vessel, a carbide-feed valve, a partly-revoluble rod to operate the carbide-feed valve, said rod having a detent segment-arm and an operating-arm, a gasometer having a gas connection with the generating vessel and a movable element having means to engage and actuate the operating-arm, and a partly-revoluble, manually-operated element having a segment-arm to coact with the segment-arm to lock the carbide-feed-valve-operating rod in position to close the valve and maintain the operating-arm out of operative relation to the actuating means of the movable element of the gasometer.

753,694. MANUFACTURE OF GLASS STONE.—Louis A. Garchey, Paris, France. A process of manufacturing glass stone consisting in running fluid devitrifiable glass into a cold mold and allowing it to set, then inverting the molded mass into a mass of refractory material, passing the two masses through a suitable temperature to devitrify the mass of devitrifiable material while inverted, and then molding the devitrified mass to the required form.

753,695. MANUFACTURE OF GLASS STONE.—Louis A. Garchey, Paris, France. This apparatus consists of a furnace including a circular movable bed having annular grooves for the reception of glass, a hopper for distributing the glass in said grooves, spraying means for scattering into the grooves a liquid containing insulating material, and means for cutting the glass strips formed by the grooves into suitable blocks.

753,707. FIREPROOF BUILDING BLOCK OR SLAB.—Robert Illemann, London, England, assignor to Frederick Malcolm Hurdis Jones, Kentish Town, county of London, England. A building block or slab having one or more openings passing therethrough from the top of the bottom, the openings being made in the form of helical grooves or recesses.

753,712. METALLURGICAL FURNACE.—Ferdinand Kepp, Brooklyn, N. Y. A metallurgical furnace including a discharge-flue, a melting-chamber and a superposed initial heating-chamber, the chambers having independent communication with the discharge-flue at their rear ends, separate heating means arranged to direct products of combustion through the chambers to the flue, and means for establishing communication between the chambers at points intermediate of their ends.

753,748. COKE-DRAWER'S LAMP.—John S. Snyder, Meyersdale, Pa. The combination with a lamp, comprising an oil-font, a wick-chamber, and a feed-tube connecting the same, of a hanger secured to the feed-tube between the font and burner-tube, the hanger comprising an elongated U-shaped wire spread laterally at the bend to form a loop-handle, and a sheet-metal strip having its side edges folded over upon the arms of the wire below the handle, the lower end of the strip and lower ends of the arms of the wire being bent or coiled around the feed-tube.

753,772 and 753,773. GOVERNING MECHANISM FOR TURBINES.—James Wilkinson, Birmingham, Ala., assignor to Wilkinson Steam Turbine Company, a corporation of Alabama. In a motor, a governing mechanism comprising a plurality of valves coupled in series, and a governor-controlled power means of varying potential for serially controlling the valves.

753,774. GOVERNING MEANS FOR ELASTIC-FLUID TURBINES.—James Wilkinson, Birmingham, Ala., assignor to the Wilkinson Steam Turbine Company, a corporation of Alabama. In a turbine operating by stage expansian, a plurality of supply-nozzles, independent valves therefor, and a plurality of stage-valves, one or more of which are opened and closed under the control of each of the supply valves.

753,787. AIR-COMPRESSOR.—Cyrus S. Dean, Buffalo, N. Y. The combination, with a power-cylinder, and two compressor-cylinders arranged at its ends; of pistons slidable in the said cylinders, piston-rods connecting the pistons together in pairs and having guide-slots at their middle parts between the pistons, guide-blocks slidable vertically in the slots, a crankshaft, pivoted arms operatively connected with the guide-blocks, and driving connections between the arms and the crankshaft.

753,818. APPARATUS FOR GENERATING ACETYLENE GAS.—George J. Atkins, Tottenham, England. In an apparatus for generating acetylene gas from dry pulverized materials, a gas-holding chamber, a drum having a partition extending from one side of the circumferential wall into proximity to the other side of the wall, and within the chamber.

753,819. ELECTRODE.—George J. Atkins, Tottenham, England. An electrode for electrolytic or the like apparatus which consists of a sheet-metal conductor, a carbon or other analogous electrode proper and a conducting, but waterproof, substratum, interposed between the said conductor and the electrode proper for the purpose of isolating the conductor from the electrolyte while establishing and maintaining electric connection between the conductor and the electrode.

753,822. METHOD OF EXTRACTING GOLD FROM REBELLIOUS ORES.—Edward C. Broadwell, Chicago, Ill., assignor, by direct and mesne assignments, to John A. Lyons, Chicago, Ill., and Sarah A. Starring, Springfield, Ohio. The method of extracting gold or platinum from rebellious ores, comprising first pulverizing the ore, next mixing the same with an alkaline or alkaline-earth hypochlorite solution to which proper molecular quantities of the oxysalt of a heavy metal which can be precipitated by hydrogen sulphide from its acid solutions has been added.

GREAT BRITAIN.

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy:

Week Ending February 20, 1904.

1,142 of 1903. FACE MASK.—A. Pollard, London. Improved face mask of wire and fine cloth for use in mines and other dust-laden atmospheres.

1,165 of 1903. COAL WASHER.—E. Wright, London. Improved form of coal and ore washer in which the material falls down an inclined surface up which flows a stream of water.

1,614 of 1903. MINER'S DRILL.—J. Tonge, Bolton. A miner's drill formed in the shape of a hollow cylinder with spiral ridges inside and outside to remove the rock cut.

2,219 of 1903. HYDRAULIC PRESS PISTON.—Hulton Colliery Co., Liverpool. Improvements in the pistons of hydraulic presses used in breaking down coal.

2,574 of 1903. ELECTROLYTIC EXTRACTION OF METALS.—Mechwart, Coltri & Co., Milan, Italy. In electrolytic cell for the extraction of metals from roasted sulphides, the use of a liquid diaphragm between the anode and cathode cells and the use of a heated anode.

4,625 of 1903. TREATING COPPER SULPHATE.—G. Gin, Paris. A method of separating iron from copper sulphate solutions by boiling with copper oxide under pressure at certain temperatures, thus precipitating all the iron as oxide.

5,597 of 1903. CASE-HARDENING STEEL.—C. Lamargese, Rome. Use of a mixture of lamp black and charcoal for case hardening steel, the addition of lamp black hastening the process.

6,283 of 1903. FURNACE.—G. Grondal, Djurshohn, Sweden. An improved form of furnace for making iron sponge from fine ores.

6,376 of 1903. ELECTRICALLY IGNITING MINERS' LAMPS.—W. Best, Morley. Improvements in electrically igniting miners' safety oil lamps.

7,203 of 1903. BORE-HOLE PLUMMET.—T. Hillmer, Ascherleben, Germany. A bore hole plummet for registering any deviation of boreholes from the perpendicular.

26,145 of 1903. MELTING METALS.—Hoerder Bergwerks and Hütten Verein, Hoerde, Germany. A combined gas jet and electric arc for melting metals, the carbon electrode being hollow, and the gas issuing from it.

27,438 of 1903. MINE CAR ATTACHMENTS.—J. T. Dunstan, Aberdare. Improved method of locking the shackle pins of miners' trams.

SPECIAL CORRESPONDENCE.

Denver. Mar. 5.

(*From Our Special Correspondent.*)

The jury in the District Court, Cripple Creek, which tried the strike leaders—Sherman Parker and Thomas Foster—on charges of conspiracy to wreck a train on the Florence & Cripple Creek Railroad, returned a verdict of not guilty. The district attorney entered a *nolle prosequi* in the case in which three other union miners were charged with causing an explosion in the Vindicator mine. At a meeting of the Mine-Owners Association of Cripple Creek, yesterday, at Colorado Springs, almost every large property was represented except the Portland. The management of the association's affairs by the executive committee was commended. The Portland and the Midget, also under the Portland management, and a number of leases are the only properties in the Cripple Creek district where union miners are now employed, and it is reported that a serious disagreement has arisen between the Western Federation of Miners and the Portland management. Further labor disturbances in the Cripple Creek district are feared.

The civil authorities at Telluride have arrested 33 men on vagrancy charges. They had been loafing and refusing to work. Six were dismissed, but 27 were given the option of going to work, or leaving the town, or paying a fine of $25. Fourteen were put to work on the streets and roads to work out their fines at $2 per day. The men are now out on bail.

The Rocky Mountain pyrite smelter at Florence, idle for two years or more, has been sold at public auction, to satisfy debts and tax claims, to Mrs. A. N. Kendall, of La Moille, Ill., for $34,330. Mrs. Kendall represented a majority of the stockholders, who bid the plant in. It is said that new roasters will be built and that the plant will be in operation before the end of the year. The smelter was built some years ago at a reported cost of $500,000. Just before it closed a large reverberatory furnace and a large lead furnace were added.

San Francisco. Mar. 2.

(*From Our Special Correspondent.*)

Two more large gold-producing mines have closed owing to labor troubles, the Midas, at Harrison gulch (or Knob), Shasta county, and the Rawhide, at Jamestown, Tuolumne county. At the Midas, the largest gold-producing property in Shasta county, there was 'a walk-out' on complaint of improper food at the company's boarding house, but this was settled. The present trouble is owing to the employment of a machinist whom the miners called a 'scab.' They demanded his discharge. The demand was refused by Mr. McIntosh, the vice-president and manager, and the property is closed indefinitely. The Gladstone mine, at French Gulch, not far away, has been able to start with non-union men. At the Rawhide, owned and managed by Capt. W. A. Nevills, guards are keeping striking miners away from the property. The men who quit were paid as follows: engineers $3, miners $2.75 and muckers $2.25. They ask an increase of 25c. per day for each class of workers. Scarcely one of the strikers speaks English; they are Austrians brought in the mine to do underground work. The Rawhide Gold Mining Co. owns also the App mine, closed for some months. Judge Morrow, of the United States Circuit Court, granted a temporary injunction against the Jamestown miners' union and the Tuolumne union, and four deputies are on the spot. The complaint alleged that $100,000 damages have been done at the App mine and that members of the unions unlawfully conspired against the mines; that they have attacked non-union men, and threatened to blow up the ditch; that this company is expending $25,000 a month on its mines, and that the damage at Jamestown amounts to $500,000. The company says it appeals to a Federal Court because "That in and by a pretended law of the State of California entitled 'An act to limit the meaning of the word "conspiracy" and also the use of "restraining orders" and "injunctions as applied to disputes between employers and employees,"' approved March 20, 1903, the company is deprived of its property without due process of law and denied the equal protection of the laws and abridged of its privileges as a citizen of the United States, and is further deprived of its full and adequate remedy insured by the constitution of the United States." This action is similar to that now pending in the cases of the Royal Consolidated Mines and the Mountain Copper Co. The Rawhide Co. asks that the injunction be made permanent.

Such labor troubles will keep down the total bullion product of the State this year and prevent investments in mines. No trouble of this sort was experienced when American miners only were employed, but at present the foreign element largely predominates in the miners' unions of the Mother Lode counties.

About 29 of the corporations furnishing light and power in the central and northern portions of this State have consolidated. The Bay Counties Power Co. and the Standard Electric Co. absorbed all rivals, and now have been absorbed by the California Gas & Electric Corporation of San Francisco. The field embraces practically the region between the Sierra Nevada mountains and the ocean and between Butte county and Santa Clara county. Light and power have been furnished to mines and towns in Amador, Calaveras and other counties. The new corporation now has main distributing lines aggregating 1,080 miles, supplies light, heat and power to 20 counties. The installations now produce 45,000 h. p. and other plants in process of construction will supply 33,000 h. p. more. The company has bought water rights and storage reservoirs in many counties. The general manager, J. A. Britton, who has been connected with the Oakland Gas Co. for many years, is an owner in the Lightner quartz mine at Angels, Calaveras county; the Gray Wing drift mine, at Blue Ravine, Sacramento county, and of other companies, and can understand fully the requirements in mining work. Most of the directors of the company are mining men. Eugene de Sabla has been interested in mines in Nevada county; John Martin owned many mines, among them the App and Rawhide, in Tuolumne county; John C. Coleman is one of two brothers who took $10,000,000 out of the Idaho mine at Grass Valley, and is still interested in mines; N. D. Rideout was a large owner in gravel mines in Butte county; Fred W. Zeile inherited interests in the Zeila mine in Amador county, and Frank G. Drumm is local agent for the Pacific coast properties owned by the old firm of Haggin & Tevis.

The California cement companies did not succeed in getting the contract for cement for the great Tonto basin irrigation dam in Arizona. A Denver company bid $4.81 per bbl., and the Pacific Portland Cement Co., of this State, $5.70.

The commissioner of the General Land Office has ruled against the mineral protestants in the matter of certain lands near Wallace and Comanche, Calaveras county. The railroad company had taken this land and the contestants argued that they were mineral in character.

Victoria. Mar. 1.

(*From Our Special Correspondent.*)

Coast Districts.—In the Richard III., at Mount Sicker, good ore is reported cut at the 500-ft. level. The mine is shipping 50 tons a day to the Crofton smelter.

Cariboo District.—The snowfall has been exceptionally heavy, it being fully 5 ft., and adequate water supply for hydraulic mining this season is practically assured. Work steadily progresses at the drift mines on Slough creek and Willow river.

Lillooet District.—The new steel dredge, built at Lillooet for the Iowa Gold Dredging Co. at a cost of $87,000, is completed. Two California men will direct the work.

Nelson District.—The Hunter V mine is shipping steadily two to three carloads of ore a day. The Wilcox mill may install one more stamp as soon as the roads are in better condition.

Yale District.—A 150-ton concentration plant will be installed at the Nickle Plate mine, at Hedley.

San Luis Potosi. Mar. 2.

(*From Our Special Correspondent.*)

The new tariff schedule for the republic increases materially the rates on iron and steel. This new schedule goes into effect April 1, and all firms are hurrying in supplies, especially the big contractors, who have made their estimates on the old rates.

In Guanajuato the closing of the deal on the Valencia and Rule estate, and the beginning of operations thereon, are awaited The plan contemplates a central compressor plant, run by electricity. The old machinery, run by compressed air in place of steam, will be used for bailing. The work will be in charge of C. W. Van Law. The Cedro and Aurora are not doing as well as last year, and work on the old tunnel of La Union has practically ceased. The Carmen, however, continues in excellent condition, and on the adjoining property Messrs. Bryant and McIlheney are catching the Carmen vein on its dip. The best looking property in the camp is the Sirena, of the Guanajuato Consolidated Mining & Milling Co., which has large ore bodies blocked out. All the 60 stamps are dropping; electric power is used at mill and mine. An electric trolley is contemplated to replace the mule tram between the mine and mill, as is a cyanide plant to treat the tailings, replacing the present pan amalagmation. M. E. MacDonald is manager. The Cuba Mining & Milling Co., of Walter M. Brodie, has its new 20-stamp mill in operation, equipped with electric power.

About 25 miles northwest from Guanajuato, in the Comanja district, of the State of Jalisco, an old iron smelter, known as the Ferreria de Comanja, with two stacks, is being put in working shape, after many years' idleness, by the Honey Bros., of Mexico City, under the direction of Herbert E. Brooke. The owners have iron ore and limestone lands, and timber charcoal, and expect in about two months to be making 20 tons of pig iron per day. Robert C. Eaton and associates, of San Luis Potosi, are opening a new property, the Santo Domingo. The mine and mill of the Nuevo Cinco Señores, which, after years of mismanagement, was recently put on a paying basis under the charge of Robert C. Eaton, are closed down and in the hands of a receiver, pending the liquidation of the affairs of the owners, J. H. Bahusen & Co., bankers of San Luis Potosi, who failed in October, 1903. The property will probably soon be sold to meet liabilities. The property comprises some 67 pertinencias, the ore is generally low grade, a new shaft had just been started, and there are large amounts of waste in the mine, which could be profitably treated by cyanide.

Perth. Feb. 1.

(*From Our Special Correspondent.*)

At Kalgoorlie a new fume destroyer, patented by Mr. F. Moss, of the Kalgurli Co., has had a satisfactory test. The total dividends paid by Western Australia companies, 1890 to end of 1903, were £9,527,517.

Kalgoorlie.—The Oroya-Brownhill winze is 229 ft. below the 10th level. The ore averages 3½ oz. per ton. The Great Boulder proprietary is making good progress with the surface equipment. The Associated Co.'s new mill to treat medium grade ores is expected to start in March. The lower levels are opening up splendidly. The Kalgurli is obtaining some of the richest specimen ore ever found in that mine, from the 1,000-ft. level. A large body of ore has been opened for some length which appears to be quite distinct from other proved lodes. The values are greatly improving, some of the material hanging together with masses of free gold and telluride. The winze following this lode below the 1,050-ft. level is in rich telluride and free gold ore.

Norseman.—Owners of the Lucky Call mine are getting good ore, and rich ore is found in the Valkyrie lease.

Murchison Gold-Field.—The great Fingall Consolidated will have 100 stamps dropping shortly. The leases adjoining the Fingall on the north are being floated in Perth as the Great Fingall Associated Mines, Ltd., and are of promise. Work has started under management of C. J. Grace.

North Westfields.—A London syndicate is securing several options on the Pilbarra field. The Pilgrims Rest mine has 20 pumps at work. The last crushing was 706 oz. gold from 700 tons. The survey of the new railway from Port Headland is in progress.

London, Feb. 27.

(From Our Special Correspondent.)

In my letter last week I referred to the long-continued struggle for the control of the Associated Northern Blocks, Ltd., and mentioned that at the meeting of shareholders, to be held this week, a new board of directors was to be appointed. It turned out that for the five vacancies no fewer than 16 gentlemen were nominated. Mr. Landau was in the chair and, by aid of counsel, had prepared an extremely artful system of voting. Shareholders naturally imagined that the whole of the names would be submitted in one resolution, and that the total number of votes cast in favor of each candidate should decide the result. Mr. Landau's scheme, however, was that the nomination of each gentleman should be a separate resolution, and that shareholders should vote for or against each individual, one after the other; and that the first five on the list so voted for, that had a majority of votes for, over votes against, should fill the vacancies on the board. This system was not fully explained when the voting papers were handed round, and consequently quite a number of shareholders simply voted for their own candidates and did not record their votes against the others. The result was that Mr. Landau and his party have been elected. It is noteworthy that out of the five, four are directors of the parent company, the Associated Gold Mines of Western Australia, and that the holding of the latter in Northern Blocks has been used by Mr. Landau for voting purposes. The votes thus given were sufficient to make the difference between votes for and against his party. It is doubtful whether these votes are valid in law, as a director is not allowed to vote at a meeting of the board on any subject which concerns himself. The resolution of the board of the Associated Gold Mines to use its votes in favor of the election of themselves as directors of the Northern Blocks centainly comes within this category, and is therefore *ultra vires*. If any shareholder chooses to take up the point, there is no doubt that an injunction could be obtained to prevent Mr. Landau and his party from assuming the duties of directors. While, from one point of view, it is desirable that the quarrel about the directorate should be allowed to subside, yet on higher grounds it is sincerely to be hoped that the election will be declared void, and that new men of position and experience will be appointed. Among the 16 gentlemen there were several names that would be suitable, such as F. H. Hamilton and J. H. Cordner James, who are well known mining engineers, and Sir West Ridgway, J. F. Remnant and F. E. P. Gardner, who are known as men of position and men of business, who would be competent to act as trustees for the shareholders.

The issue of the balance of the authorized capital of the British South Africa Co. was made this week. This amounts to £400,000, nominal, and is being issued at £1 13s. 9d. per £1 share to present shareholders in the proportion of one new share to every 10 now held. The total issued capital will now be 5,000,000 shares of £1 each, nominal. The company was originally formed in 1889 with a capital of £1,000,000, which was increased in 1893, 1895, 1896, 1898 and 1899 until it has now reached its present figure. In every case when new shares were issued the amount obtained for them was above par, and has ranged from £1 13s. 9d. on the present occasion to £3 10s. in 1895. During the whole time none of the shares has been offered for public subscription, and each succeeding issue has always been absorbed by shareholders then on the list. There are at the present time no less than 38,000 shareholders. It was anticipated a few years ago that no further capital would be required, as the income was rapidly approximating to the expenditure. The stagnation of Rhodesia has, however, had a depressing effect on its finances, and it has been deemed advisable to make this present issue in order to increase the resources of the company.

TO ENGINEERS VISITING NEW YORK.

A room for the exclusive use of visiting mining engineers is maintained at the New York office of the ENGINEERING AND MINING JOURNAL. Visitors to the metropolis are cordially invited to take advantage of the facilities it offers, by having their mail addressed in care of the JOURNAL, and making this office their headquarters. The managers of the branch offices will also be glad to welcome visiting engineers and to be of any service to them that they can.

TO ENGINEERS VISITING LONDON.

We are informed that the Institution of Mining and Metallurgy offers to all members of the American Institute of Mining Engineers nonresident in Great Britain, the privilege of free use of the Institution offices and library in Salisbury House, London Wall, E. C. Visiting engineers may have their letters addressed to the offices of the Institution, and thus enjoy the advantages of temporary office accommodation in the city of London.

PERSONAL.

Mining and metallurgical engineers are invited to keep the Engineering and Mining Journal informed of their movements and appointments.

Mr. John H. Hammond is on his way to El Oro, Mexico.

Mr. Jas. Macfarlane, now a resident of Denver, is visiting New York.

Mr. Percy Ramsden is in New York on a visit from Guanajuato, Mexico.

Mr. E. N. Van Cortlandt, of Denver, has been on a visit to eastern Utah.

Mr. A. H. Elftman, of Minneapolis, is examining mines at Park City, Utah.

Mr. M. J. Heller is examining properties at Tonopah and Goldfield, Nevada.

Capt. John Treweek, of Salt Lake City, returned from London by the *St. Louis*.

Mr. A. C. Beatty is leaving Denver on an inspection of several mines in Mexico.

Mr. Rowland F. Hill, of New York, has returned from journeys in Egypt and Morocco.

Mr. J. Langeloth returned from Europe by the *Kaiser Wilhelm II.*, arriving on March 9.

Mr. N. V. Hansell, of Stockholm, Sweden, has reached New York on his way to the West.

Mr. Robert T. Hill, of Washington, has gone to Cananea and thence to Acapulco, in Mexico.

Mr. R. B. Gleisberg is manager of the Associated Mines at Kalgoorlie, Western Australia.

Mr. Francis L. Bosqui is conducting cyanide tests at the Combination mine, Goldfield, Nev.

Mr. George A. Schroter has arrived in New York from the Dolores mine, Chihuahua, Mexico.

Mr. Bulkeley Wells, of Boston, is captain of the Telluride troop of the Colorado National Guard.

Mr. J. Gordon Hardy has been appointed manager of the Dolores mine, in Chihuahua, Mexico.

Capt. W. T. White has resigned as general manager of Carn Brea and Tincroft mines, Cornwall.

Mr. F. C. Roberts, lately from Rhodesia, arrived in New York by the *New York* on March 5.

Mr. Carlos Riedt, manager of the Peñoles mines at Mapimi, Mexico, has gone to Europe on a holiday.

Mr. George A. Laird has resigned as general manager of the Victoria mines, Cerro de San Pedro, Mexico.

Mr. A. F. Lucas, of Washington, D. C., is investigating the oil field on the Isthmus of Tehuantepec.

Mr. J. H. Curle is examining the Amurzky mines, 300 miles north of Blagovestchensk, in Eastern Siberia.

Mr. J. T. Marriner sailed on the *Kaiser Wilhelm der Grosse* on March 5, en route from Korea to London.

Mr. F. M. Simonds, of Simonds & Wainwright, New York City, is in the West on professional business.

Mr. Francis J. Dennis, of London, reached New York by the *Oceanic*, on March 2. He is en route to Mexico.

Mr. J. W. Rayfield has resigned the management of the Lady Stenton mine at Menzies, Western Australia.

Mr. G. C. Hewett has been examining mines west of Guadalope y Calvo, in Sinaloa and Chihuahua, Mexico.

Mr. Alliene Case sailed by *El Moro* for Cuba to take charge of operations at El Cobre mine, near Santiago.

Mr. T. H. Oxnam, general manager of the Palmarejo & Mexican Gold Fields, Ltd., is at Los Angeles, California.

Mr. Roscoe R. Leslie is superintendent of the Creston Colorado mine, in the Minas Prietas district, of Sonora, Mexico.

Mr. J. W. Mercer, of the South American Development Co., has proceeded from Zaruma, in Ecuador, to examine mines in Peru.

Mr. E. Jacobs has been appointed secretary to the Provincial Mining Association of British Columbia, with headquarters at Victoria.

Messrs. Charles R. Guertler and Edward Towrey, of the Engineering Co. of America, have returned to New York from Copper Cliff, Ontario.

Mr. Charles W. Wheelock, Jr., of the Birmingham office of the Engineering Co. of America, recently made a report on coal fields in Walker county, Alabama.

Mr. J. H. Means, formerly of Cape Breton, N. S., has accepted the position of superintendent of the blast furnaces of the Colorado Fuel & Iron Co., at Pueblo.

Mr. Bernard MacDonald, of Spokane, is visiting Mr. M. E. MacDonald, manager of the Guanajuato Consolidated Mining & Milling Co., in Guanajuato, Mexico.

Mr. Foster Hewett is making an examination of the Los Tajos mine of Mr. Sheppard, near Moreles, Chihuahua, Mex., and will spend a week at Globe, Ariz., on his return.

Mr. Fritz Gleim, formerly manager of the Rockhill furnaces, at Rockhill, Pa., has accepted the position of director of the blast furnaces and coke works of the Societa Elba at Portoferraio, Elba, Italy.

Will anyone who knows the present address of Mr. F. Cremer, who was employed at the Argentine smelter of the Kansas City Smelting & Refining Co. from 1899 to 1901, kindly send it to this JOURNAL.

Mr. A. Howell Van Cleve has been appointed resident engineer of the Niagara Falls Power Co., succeeding Mr. W. A. Brackenridge, who was recently appointed to the Advisory Canal Board by Governor Odell, of New York.

The Kentucky Legislature has revived the State Geological Survey by making an appropriation of $15,000 annually for two years. Prof. C. J. Norwood will act as director, but the chief geologist has not been appointed.

Mr. John Fox, for several years connected with the Octave mine, Yavapai county, Ariz., has gone to South Africa for an English syndicate. Mr. G. W. Rose succeeds Mr. Fox as superintendent of the Octave cyanide plant.

Mr. Eugene A. Hardy has been appointed assistant manager of the New York & Honduras Rosario Mining Co., at its mine in San Juancito, Honduras, C. A. Mr. Hardy sailed via Panama on March 8. Mr. Walter R. Beatty, Mr. Frank J. Nagel and Mr. George Lewis accompanied him.

OBITUARY.

John Hilton Haycock, mining engineer, of Ottawa, Canada, died in that city on March 1 from pneumonia. He had followed his profession for about 30 years, having principally been engaged in the Ottawa valley and New Ontario, and was on one of the original survey parties of the Canadian Pacific Railway.

Col. John T. Grayson, a prominent mining man of Portland, Ore., died suddenly of heart failure at Cincinnati, O., February 25.

Col. Grayson was born in Nottingham, England, January 1, 1830, and was a first cousin of the late Archbishop of Canterbury, Frederick Temple, who was his nearest relative. He was interested in the Baby McKee and Last Chance mines, in the Sumpter district, besides the Alpine Consolidated Gold Mine Co., of which he was manager. His rank of colonel was won by service with the Army of the Potomac in the Civil War.

Russell Wheeler Davenport died in Philadelphia of pneumonia on March 2 at the age of 55 years. He was graduated from Sheffield Scientific School, Yale University, in 1871. After several years of study at the University of Berlin, Germany, he became, in 1874, superintendent of the Midvale Steel Works, Nicetown, Pa. In 1888 he accepted the post of assistant superintendent at the Bethlehem Iron Works, and later was made vice-president of the company, which office he held until 1901. He introduced at Bethlehem the open-hearth process for the manufacture of steel armor plate and guns, and his attainments contributed materially to producing ordnance and armor plates which successfully withstood the severe tests imposed by our Government. In October, 1903, he became general manager and director of the Cramps' Shipbuilding Co., and held the post until the time of his death. In 1894 the honorary degree of M. A. was conferred on him by Harvard University and in 1898 a similar degree was conferred on him by Yale. His wife and one son survive him.

SOCIETY AND TECHNICAL SCHOOLS.

NEW MEXICO SCHOOL OF MINES.—A scholarship valued at $150 has recently been established, open to the best member of the graduating class of each year, desiring to make a special study of mining machinery in the large manufacturing works.

OHIO STATE UNIVERSITY.—A fire recently destroyed the building containing the departments of Chemistry, Pharmacy, Metallurgy and Mining Engineering. The loss is estimated at $100,000.

INDUSTRIAL.

The Fred M. Prescott Steam Pump Co. has obtained the contract for a large pumping plant from El Oro Mining & Railway Co., of El Oro, Mexico.

The Velardena Mining Co., of Durango, Mexico, is preparing to build a railroad from its mines 18 miles to Jimulco station, on the Mexican Central Railroad.

It is announced that the Pencoyd Iron Works at Wissahickon, Pa., will resume work April 1. The plant shut down last fall, throwing more than 2,000 people out of work.

Octave Chanute, of Chicago, will build a tie-preserving plant at Terre Haute, Ind., for the Southern Indiana Railroad. It will have a capacity for treating 2,000 ties per annum.

The Berwind-White Coal Mining Co. has bought for $1,000,000 the Roaring Creek & Charleston Railroad, an eight-mile line which goes through a coal tract recently acquired.

The Tirrill Gas Machine Lighting Co. has made a successful installation of a Tirrill gas machine and a number of its improved laboratory Bunsen burners at the Sandy Hook proving grounds of the Government.

The six open-hearth furnaces just completed at the Carnegie Steel Co.'s works at South Sharon, Pa., will be started soon. The other eight open-hearth furnaces at this plant are in full operation. All are of 50-ton capacity.

The Canada Corundum Co., of Toronto, Ont., announces that its new mill is completed, and from now on it will be able to supply the wants of all its customers. The Craig mine has the largest abrasive mill ever erected in any country, its capacity being from 5,000 to 8,000 tons per year of finished product.

The Syracuse Smelting Works recently completed its copper plant in Montreal, Can., and expects shortly to manufacture phosphor copper and phosphor bronze, as well as bronze ingots. This is the first material of the kind that has ever been made in Canada, as all the copper made in the Dominion is sent into the United States to be refined.

The annual report of the Dominion Coal Co., submitted to the annual meeting at Montreal on March 3, showed an output for 1903 of 3,147,766 tons, compared with 3,174,227 tons for 1902. The net earnings were $1,756,023, as against $2,154,955 for 1902, the falling off being due to cost of labor and material, and the closing of Dominion No. 1 mine from a fire.

At the annual meeting of the Boston & Lockport Block Co., of Boston, Mass., held recently, the following officers were elected: Albert D. Bosson, president; Frank Gebbie, vice-president; Myron H. Tarbox, treasurer, and Alfred B. Tarbox, secretary. The treasurer's report showed the business in a prosperous condition. The company is preparing an exhibit of some of its specialties for the St. Louis Fair.

The Ore Concentration Syndicate has received an order for one of its Elmore oil concentrating plants from the Kassandra Mining Co., owning silver-lead properties in Macedonia. The shares of this company are held mostly in France. The ore has to be crushed to 60 mesh in order to separate the ore from the limestone gangue, and two-thirds of the ore was lost as slimes when attempts at concentration were made with concentrating tables.

The Wellman-Seaver-Morgan Co., Cleveland, O., held their annual meeting recently and elected the following officers: S. T. Wellman, president; J. W. Seaver, chairman of board of directors; S. H. Pitkin, first vice-president; R. T. Morgan, second vice-president; G. H. Hulett, third vice-president; C. H. Wellman, general manager, and A. D. Hatfield, secretary and treasurer. The directors include the officers named and also W. F. Carr, J. C. Wallace, J. MacGregor and A. B. Rinehart.

Justice Leventritt, of the New York Supreme Court, has refused to confirm the sale of the National Salt Co. last September for $337,500 to the International Salt Co., in a suit brought to upset the sale by Chauncey H. Strickland, one of the minority stockholders. Justice Leventritt said there should be a re-sale with greater opportunity to investigate and make equitable terms, intimating that the order of sale had been drawn in the interest of the International company, which already held a majority of the stock of the National company.

Announcement has been made that the American Locomotive Co. has acquired the Locomotive & Machine Works, Ltd., of Montreal for $1,500,000. Of this amount the Montreal locomotive company, it is said, will receive $1,000,000 in cash and $500,000 in new 4% bonds, which will be issued by the American Locomotive Co. It is stated that duty on American locomotives sent to Canada is 35%, or an average of between $6,000 and $7,000 on each engine. The company will take possession of the Montreal plant immediately.

The half interest of the Cary Brothers, in the Mine & Smelter Supply Co., of Denver, New York, Salt Lake City, El Paso and City of Mexico, has been purchased by the Seep interests in that company, and the new officers are James H. Fennessy, president and treasurer; Albert H. Seep, vice-president; Herbert E. Fiske, secretary, and Chas. N. Tibbetts, general manager. The new president is a son-in-law of Jos. Seep, the purchasing agent of the Standard Oil Co., and Albert H. Seep, the vice-president, is a son. The Seep interests now control the company.

The Allis-Chalmers Co. has entered into an arrangement with the Bullock Electric Manufacturing Co. whereby the business of the latter will be taken over and the business of both companies carried on as that of a single interest. The business of the Bullock company will be conducted as heretofore by its present management under the form of a new Bullock Electric Manufacturing Co., with George Bullock president, and Joseph S. Neave, vice-president. This combination will give the Allis-Chalmers Co. the facilities of an electric machinery plant and the Bullock company will have for its electric generators the reciprocating steam engine, steam turbine, gas engine and hydraulic turbine, now constructed by the Allis-Chalmers Company.

TRADE CATALOGUES.

The Phosphor-Bronze Co., Ltd., of Philadelphia, Pa., in its price list No. 22, gives the prices for many sizes of roll and sheet phosphor-bronze, phosphor-bronze wire and other specialties in which its "Elephant Brand" phosphor-bronze figures.

The C. O. Bartlett & Snow Co., of Cleveland, O., manufacturers of elevating and conveying machinery, has issued catalogue No. 9 in the interest of the company's interlocking chain-belts, showing many styles and sizes with attachments therefor, supplemented with a complete price-list. For those interested in conveying machinery the company recommends its general catalogue No. 7, of nearly 300 pages.

Hydrants and valves in various styles and sizes are described and illustrated in catalogue B, issued by C. W. Thomas, successor to the Michigan Brass & Iron Works, of Detroit, Mich. The catalogue, however, is not confined to those subjects alone, but deals with indicator posts, sluice-gates, and general water, steam and gas supplies. Catalogue A, already issued, contains the brass goods manufactured by the company.

Hydraulic mining machinery, such as giants, deflectors and water gates, are described and illustrated in an 8-page pamphlet, issued by the California Hydraulic Engineering & Supply Co., of San Francisco. Riveted sheet steel pipe, from 5 to 30 in. in diameter, of varying strength is also tabulated. Reservoir and sluice gates, ball and expansion joints, air valves, canvas hydraulic mining hose, sluice riffles and allied specialties, have also received some attention.

The Union Metallic Cartridge Co., Bridgeport, Conn., has issued a vest-pocket size booklet, entitled "Trap-Shooting and Records," which gives, in addition to the information covered by the title, a number of other interesting suggestions in the shooting line, including favorite loads of different expert trap-shooters. The company will send a copy of this booklet to those addressing department P of the company, 313 Broadway, New York City, and mentioning this paper.

GENERAL MINING NEWS.

Interstate Conference of Bituminous Miners and Operators.—Owing to the failure of the first conference to agree on a wage scale, another was held at Indianapolis, the opening session being on February 29. On March 1 formal proposals were made by either side, the operators voting for a reduction of 15% in the mining rates from the 1903 scale and the miners voting for the adoption of the run-of-mine basis, with a scale equivalent to the present scale for screened pick-mined coal; a 7c. differential between machine and pick mining in the Ohio and western Pennsylvania field; a uniform wage scale for outside labor; an advance in pay for brushers in long-wall mines; and for settling troubles originating in any district in that district.

In the debate that followed, Messrs. F. L. Robbins, W. S. Bogle, H. L. Chapman, Guthrie and Mullins spoke for the operators and Messrs. John Mitchell, T. L. Lewis and Patrick Dolan for the miners. The debate dwelt largely on the large earnings of the Pittsburg Coal Co. last year, although Mr. Robbins showed that in a year when abnormal prices prevailed for months the company actually earned less than 10% on an investment of $70,000,000. Mr. Robbins also made some interesting statements about the prices at which the company had recently taken contracts and the competition of coal from the Connellsville and Klondike fields and from districts in West Virginia, all of which paid lower rates for labor.

The dispute was referred to a joint scale committee and the general sessions of the convention were temporarily suspended. The joint scale committee was unable to agree and referred the matter to a sub-scale committee, comprising two operators and two miners from each of the competitive States. This committee spent several days in debate without much result until on March 5 the operators presented an ultimatum, offering a compromise on the basis of a

reduction of 5.5% from the present scale. This offer called for a reduction of 5c. a ton in the cost of pick mining for 1.25-in. mesh screened lump coal in western Pennsylvania thin vein, in the Hocking Valley, which is the basing district of Ohio, and in both the bituminous and block mines in Indiana, and a reduction of 3c. a ton on mine-run pick mining in the bituminous districts of Indiana and Illinois. The prices of machine mining are to be reduced 4c. a ton on screened lump coal in western Pennsylvania thin vein and in the Hocking Valley, and 3c. a ton on the mine-run machine mining in Indiana and Illinois. The wages of the track layers, timber men, drivers, water haulers, machine haulers and bottom cagers, who have been receiving $2.56 a day since last April, would be reduced to $2.42, or 14c. a day. Pipe men would be reduced from $2.52 to $2.36, and all other inside day labor from $2.36 to $2.23 a day.

Mr. Mitchell and other leaders of the Mine Workers were in favor of accepting this offer, but the miners at a meeting on March 7 voted to refer the ultimatum to the men in all the fields where contracts expire April 1, who will vote on it on March 15. The ballots are to be counted and the result made known by Secretary Wilson on March 17.

Chesapeake & Ohio Railway.—Coal and coke shipments in January, 1904, and the seven months of the fiscal year beginning July 1, 1903, in short tons were:

Coal.	January.	Seven months.
New River	362,671	1,939,274
Kanawha	200,481	1,186,030
Kentucky	11,886	97,191
	575,038	3,222,495
From connections	15,512	114,567
Total	590,550	3,337,062
Coke.		
New River	29,398	181,746
Kanawha	2,135	27,397
	31,533	209,143
From connections	.....	150
Total	31,533	209,293
Grand total	622,083	3,546,355
Grand total, 1903	516,073	1,188,094

The improvement in the seven months of the present fiscal year is principally due to the heavier shipments of coal to western points.

Petroleum Development.—The operations in the eastern oil-fields during February, according to the Oil City *Derrick*, were as follows: Pennsylvania completed 504 wells, 148 dry, giving a new production of 5,321 bbl.; Ohio completed 186 wells, 22 dry, production 2,029 bbl.; Indiana completed 157 wells, 8 dry, production 2,081 bbl.; West Virginia completed 168 wells, 45 dry, production 3,348 bbl. Fewer wells were completed in February than during any month since January, 1903, and the new production is below the average of many months of last year, due greatly to extreme cold weather.

ALASKA.

Prospectors have returned from the Sawtooth range, 60 miles north of Nome, with favorable reports of quartz finds, all free gold, the decomposed material on the surface panning from $2 to $3 to the pan. The ledge is said to be readily traced for four miles, and locations have been made the entire length.

Benches along many of the Nome creeks are being prospected this winter to bed-rock, it is reported, and dumps are rapidly accumulating that will wash from $10,000 to $30,000 in the spring clean-up. These are along Buster, Cripple, Otter, Center and Dry creeks.

On the Blue Stone there is considerable work under way, in anticipation of a ditch being built in the spring. More dredgers will be operating in the Nome district this season than ever before. They are no longer experiments.

ARIZONA.

COCONINO COUNTY.

Anita.—Work is to be resumed at once on this group of copper mines in Grand cañon district north of Williams. The Anita company has a double-compartment shaft, now 300 ft. deep. This is to be enlarged to three compartments, and is to be sunk at least 1,000 ft. deep. The hoisting machinery will be capable of handling a shaft 2,500 ft. deep. An 8-drill air compressor has been ordered, and the old smelter, near Williams, will be re-erected at the mine. The main trouble in operation has been the lack of water, which is secured mainly from reservoirs in gullies near by.

GILA COUNTY.

Taylor & Bird.—These two groups of 20 claims in the Globe district have been transferred to Burdon Gaylord, of Los Angeles, Cal., for $200,000, with $6,000 down. The Taylor group embraces 12 claims, owned by Charles E. Taylor and associates, and the Bird group takes in eight claims, owned by Henry Shoap, William Stevenson, Winthrop House and Mrs. Lizzie House. Leonard O. Sivyer, of Los Angeles, who will have charge of the development work, is arranging for extensive operations. There is considerable development already done, which shows several veins of copper ore on both groups.

MARICOPA COUNTY.

(From Our Special Correspondent.)

Garcia.—This mine, in Vulture district, which has been closed for some time, is again in operation.

Gold Quarry.—A contract has been let for sinking a 400-ft. shaft on this mine, at Morristown.

MOHAVE COUNTY.

(From Our Special Correspondent.)

Blue Bird.—This turquoise mine, at Mineral Park, has been sold by Thomas Graves, of Chloride, to Englishmen for $2,000.

Buckeye.—This mine, at Mineral Park, recently bonded and leased by M. Wilson, is in good ore in the breast of the old 600-ft. drift.

De La Mar.—This mine, at Stockton Hill, is drifting 500 ft. under cover. The vein is averaging about 9 in. of high-grade silver glance.

Enterprise.—This mine, in the Wallapai mountains, is shipping ore.

Gladstone.—This mine, at Sherum's peak, belonging to Frank Tofty, of Chloride, and Fred Kellogg, of Los Angeles, is said to have 3½ ft. of concentrating lead and silver ore on the 100-ft. level.

J. F. T.—Rich copper ore is being taken from the shaft of this mine, at Acme. The shaft is to be sunk to 300 ft., where crosscutting will be done.

Minnesota.—The old dump of this mine, at Chloride, is being crushed and milled. It is estimated that there are 250,000 tons that can be profitably handled.

Maguire.—This mine, 4 miles west of King mine, is to have a new 50-ton milling plant and cyanide works. The ores carry gold.

Mohave Gold Mining Co.—This company, at Milltown, is installing a cyanide plant.

YAVAPAI COUNTY.

(From Our Special Correspondent.)

Buffalo-Arizona Mining Co.—This company, at Poland, has materially increased the working force at its three mines, and the capacity of the mill. D. Rice, of Idaho Springs, Colo., is superintendent.

C. M. & S. Co.—This company, with mines in the Bradshaw mountains, has bought the Val Verde smelter at Val Verde, and increased the capacity of the plant.

Stark Gold Mining Co.—The new 10-stamp mill of this company, near Prescott, is in regular operation on ore from the company's mines.

Sultan.—This mine, at Hillside, has resumed work. H. Le Montague is superintendent.

CALIFORNIA.

AMADOR COUNTY.

Bay State.—Work is being pushed in the different levels of this mine at Plymouth. W. W. Worthing superintendent, and the 10-stamp mill is kept busy.

Central Eureka Mining Co.—The contractors have finished sinking 100 ft. from the 2,100 ft. level, and have taken a contract for another 100 ft. of sinking. The mill at the mine is crushing about 5,000 tons monthly. The mine is at Sutter Creek, W. R. Thomas, superintendent.

Farrell.—Geo. Thomas and others have leased this mine opposite Gwin mine gulch, and have commenced work. The mine carries small seams of very rich ore.

Golden West Tunnel & Mining Co.—S. D. Chittenden, manager, has taken in a compressor, drills and a lot of other machinery, for this mine at Mooretown.

Oneida Mining Co.—The new Aldrich pump being installed on the 2,100 ft. level of this mine at Jackson, E. Hampton superintendent, has five plungers, and will be run by electricity. It will lift the water to the 1,300 ft. level, whence the old pump will raise it to the surface.

Shenandoah.—In the north drift of this mine at Plymouth, S. K. Thornton manager, a rich streak has been found.

CALAVERAS COUNTY.

Chris. Anderson.—This old mine at San Andreas, now under bond to F. J. Juchter, is to be worked by the San Andreas Gold Channel Mining Co., a new incorporation. A pump and gasoline engine are being put in, and three shifts of men are to be put at work.

Ophir.—This company has made final payment on the Lloyd mine at Central Hill, and will now push operations there.

Stockton Hill.—Three stamps have been added to the mill of this mine, and are working.

Vonich.—A rich strike has been made in this mine near Angels, at 250 ft. depth.

FRESNO COUNTY.

Coalinga Oil Field.—The number of oil companies at work either drilling or pumping at present is 51. This number does not include any company which suspended work prior to January 1.

KERN COUNTY.

King Solomon.—The sheriff has sold this group of 5 claims belonging to the Ashford Mining Co., at Randsburg, to satisfy a judgment of $6,486, obtained by T. E. Lahan.

NEVADA COUNTY.

Allison Ranch.—It is reported that this famous old mine has been bonded and will again be worked. It was closed at the time of the death of John Mackay, one of the principal owners, and large amounts had been expended in prospecting for ore bodies.

Black Swan.—The cave in this mine at Mooney Flat has been cleared, and work resumed.

Elsie A.—The Huntington mill at this mine in Selby Flat district has been started. The owners have a 3 ft. ledge in the claim.

New Eureka.—This mine at Canada Hill has suspended operations, and will not resume until better weather.

Seven Thirty Mining Co.—Work has been commenced on this mine, and men are clearing a site for hoisting works and buildings. The shaft has been cleaned out to the water level, and will be timbered to the surface.

Shady Creek.—Frank H. Hall will install new pumps and make other improvements on resumption of work on this mine in the spring.

PLACER COUNTY.

California.—This mine at Deadman's Flat, adjoining the West Point, has been bonded by Geo. R. Tuttle, of Grass Valley. It has been idle for 10 years, but recent developments in the district have caused a local company to take hold of it.

Rawhide.—Work has been commenced on this mine near Shady run, H. W. Morris, manager, but only a small force is employed. The ropeway at this mine is 2,000 ft. long.

Southern Cross.—This mine at Humbug cañon, under management of Mr. Trimble, has been running full force for the season. The 10 stamp mill, run by electricity, is to be enlarged.

SAN BERNARDINO COUNTY.

The Chase group will soon have its mill at work, and another mill is being installed at the Roosevelt. There are 90 men employed at

the Bagdad group, 25 at the Chase, and 40 at the Roosevelt. When the mills start more men will be put on. A pipe line is being built from Lavic Lake, eight miles distant. In the dry lake bottom a number of wells have been sunk, and water met with at 85 ft.

SANTA BARBARA COUNTY.

Deep Drilling.—The Western Union Oil Co. is drilling three wells, which will be sent down 3,600 ft., to strike the lower oil sand. The oil stratum in which the other 25 or more wells are sunk is not very thick, so the yield of the wells is not as heavy as in other fields. Both the Union and Pinal companies have been successful in deep wells. The Union company has a well on the Purissima property, now down over 3,500 ft., and is about 600 ft. in oil sand. The Pinal company has also been successful with its deep well.

SHASTA COUNTY.

Afterthought.—The electric current has been turned on at this mine, owned by the Great Western Gold Co., so that now the compressors and other machinery will be run by electric instead of steam power. The steam plant will be kept as auxiliary.

Keystone.—This mine at Old Diggings has been sold to the Broda Mining & Smelting Co., of New York, for $40,000. A smelting plant is to be put up on the property, which carries copper ore.

Mammoth.—At this copper mine, near Kennett, two Burleigh drills, with the necessary operating machinery, are being installed by John Filius and Fred King, who have an option on the property.

Midas Mining Co.—This large property at Knob, has been closed down indefinitely, owing to the miners having made trouble because a non-union machinist was employed.

SIERRA COUNTY.

Elmore.—This mine at Ladies cañon has been closed down, it having been found impossible at this time to keep it free from water.

SISKIYOU COUNTY.

Nearly all the hydraulic mines in the county are now running full time; there being an abundance of water in the mining streams. The high water and freshets have washed out the accumulated tailings, etc., leaving a clear field for active operations. Some damage has been done, however, in filling up claims, washing out dams, etc.

Headwater Gold Mining Co.—The strike in this mine on the main fork of Humbug creek was made 250 ft. in on the Terror tunnel, and consists of a 4 ft. ledge running high in free gold and sulphurets. The ore will be shipped to the smelters when the roads permit.

Oro Fino.—Water taken from Kidder creek to supply the mines at Oro Fino has been turned into the ditches, and the Wright & Fletcher, Eastlick, and other properties are now running full blast.

TUOLUMNE COUNTY.

A. E. Stewart is constructing reduction works at Sonora, to work ore by a new process.

Bell.—Grading has been finished for the 20 stamp mill for this mine. The shaft is now down 630 ft.

Black Oak Mining Co.—This company at Soulsbyville, has been re-incorporated under the laws of Wyoming, by G. W. Campbell, Guy Scott and C. S. Dowe. The object is a legal one, and to prevent any repetition of prolonged labor strikes. The mine is to be started as soon as repairs are completed.

Columbia.—This quarry is furnishing 800 tons of marble for the new Merchants' Exchange building at San Francisco, and is employing about 60 men quarrying and polishing.

Norwegian.—This quartz mine at Tuttletown, after being operated a few weeks, has again closed down.

Sell.—This mine near Sonora, being worked by Fulcher Bros. and A. M. Divoll, has just yielded a pocket valued between $8,000 and $10,000. The strike was made 1,000 ft. from the surface, on a new vein just tapped.

Soulsby.—Boston men are about to take over this mine at Soulsbyville.

Royal Consolidated Mines.—A large new ledge of high grade ore is reported discovered in this mine at Hodson, J. C. Kemp Van Ee, manager. The 120 stamp mill has been running on low grade ore.

YUBA COUNTY.

The machinery for the two new dredges for the Hammon Co. has been taken to the Hallet place, ten miles east of Marysville, and 60 men are working on the boats, etc. The excavation in which the dredgers are being constructed is 500 ft. by 200 ft. Three large pumps keep the excavation dry.

COLORADO.

BOULDER COUNTY.

Sylvanite Tunnel Co.—This company is about to install steam and electric drills to push the bore into Magnolia mountain. The tunnel starts above the Marchioness tunnel, near Boulder, at the level of Boulder creek, and has been driven about 200 ft. during the past two years.

CHAFFEE COUNTY.

Four B's Mining Co.—The Jasper mine, near Turret, was transferred recently to this company of Lincoln, Neb., for $25,000. Heretofore the property was worked under bond and lease by the company. The mine is said to be well equipped with machinery and more will be added. A shaft is down 325 ft., and reported to show a good vein of ore.

CLEAR CREEK COUNTY.

Centennial.—This mine, at Georgetown, is shipping from the ore body opened on the 500-ft. level. The body is from 2 to 4 ft. wide, and has been drifted on 300 ft. The solid ore carries from four to 10 oz. gold, 50 oz. silver and from 10 to 25% copper. Air drills are being used.

Continental Electric Power & Irrigation Co.—This company proposes to build large reservoirs at Empire, on the north branch of upper Clear creek, and to erect a power plant there. The power will be used to generate electric current for use in the mines, and the storage reservoirs will be used for irrigation purposes. W. P. Clough is treasurer and general manager.

Honest John.—A heavy flow of water was recently encountered in this tunnel near Idaho Springs. Ingersoll slugger machine drills are being used, and the tunnel is in about 400 feet.

Lillian.—Giles & Bannon, working this mine under lease and bond, have awarded a contract to sink the shaft an additional depth of 50 ft. The Bertha mill, of which Mr. Giles is manager, ran four days and nights recently on ore turned out while sinking. The shaft is now down 300 feet.

Magnet.—A rich streak of silver and copper ore is reported opened in this property on Saxon mountain, near Georgetown. Schauer & Co. are working it under a bond and lease.

Nashville.—Machinery is being placed on this shaft, in the Russell gulch section, near Idaho Springs. The property is to be operated by a pool, under the management of Lewis Olliver. C. L. Anderson and R. B. Griffith, of Denver, are interested.

Red Oak Co.—Five sets of lessees are now working on the Sunburst lode, belonging to this company. All of them have large bodies of smelting ore reported to be worth from $75 to $150 per ton.

Stevens.—The mill on this property, near Georgetown, is handling 30 tons per 24 hours, and is to be enlarged to treat 100 tons. The present mill was designed to handle 60 tons, but fell short. C. L. Tingle is superintendent.

Yankee Boy.—M. J. O'Neill has started this work on a group of mines above Freeland.

FREMONT COUNTY.

Colorado Fuel & Iron Co.—This company is making preparations to resume work at its Bear Gulch mine, near Florence. The old company houses have been converted into bunk houses, and large supplies are on the ground. It is the intention to start with 100 men.

GILPIN COUNTY.

(From Our Special Correspondent.)

Banta Hill Consolidated Mines Co.—All of the holdings of this company in the Pleasant Valley district were sold at sheriff's sale, to satisfy a judgment of $49,000, secured by Leory J. Williams, who was the purchaser. It is reported that the affairs of the old company will be settled at an early date and steps taken to resume operations.

Cook.—Sinking operations have been concluded. The shaft is down 1,425 ft. in all, and drifting has commenced. Ground will soon be opened up warranting a regular flow of ore, and the Boston mill, at Black Hawk, owned by the same parties, has been started, and will run 25 fast-drop stamps, handling between 40 and 50 tons of ore. O. B. Thompson, of Black Hawk, is manager.

Mingo Mining Co.—William Ballantyne, of Central City, has been appointed manager, and arrangements are being made to resume work on the property in Lake district. The shaft is 320 ft. deep and will be sunk deeper.

Old Town Mining Co.—The 1,500-ft. point in this shaft has been reached. A new 100-h. p. engine has been installed, a 16 by 18 Leyner 6-drill air compressor has been received and a large addition made for machinery. The company will soon install its own electric plant for operating purposes during the next 60 days. F. E. Himrod, of New York City; G. K. Kimball, Jr., of Idaho Springs, and the Calumet Mining Co., of Pittsburg, Pa., are each one-third owners of the property. G. K. Kimball, Jr., of Idaho Springs, is manager.

Orado Gold Mining Co.—In driving the 200-ft. east level, a fine bunch of 3-oz. smelting ore has been opened. Tributers are at work in other parts of mine, shipping mill ores running between 3 and 4 oz. gold to the cord and iron which sells for $75 to the ton at sampling works. A. Skeels, of Central City, is manager.

Wilkes-Barre Mining Co.—Sinking operations are being carried on at the Baldwin property, worked under part ownership, and lease and bond. The shaft is 275 ft. deep and is to be sunk several hundred feet deeper. J. F. Harrington, of Central City, is manager.

LAKE COUNTY—LEADVILLE.

(From Our Special Correspondent.)

A. Y. and Minnie.—Crude ore at the rate of 100 tons a day is being shipped from this property, and the mill is turning out 100 tons daily of first-class concentrates.

Bartlett Tunnel.—Sugar Loaf district. A body of ore 3 ft. wide that runs 90 oz. silver and .48 oz. gold, has been opened on this property in the Sugar Loaf district, in an upraise from the breast of the tunnel, which is in 1,360 feet.

Gilt Edge.—This property, in upper California gulch, is shipping about 50 tons a day of good grade ore.

La Plata.—This property is shipping a very good grade of lead carbonate from the upper workings.

Little Pittsburg.—During the week lessees on this property at a depth of 45 ft. opened up a large body of good iron.

Radium.—Three shifts are driving on the vein now opened for over 30 ft., with no sign of diminishing values.

SAN JUAN COUNTY.

Domingo.—This group of 16 claims in Niagara gulch, east of Eureka, owned by Marshall McKenzie, Walter B. Wagner and Frank Skinner, was recently sold to the Grand County Exploration Co., of Colorado. The bond calls for $50,000, running 18 months. The new company was organized by T. K. Bailey and others of Vincennes, Ind., where the largest stockholders reside. A cross-cut tunnel has been commenced, and a 16-drill compressor plant will be used.

Gold King Consolidated Mines Co.—Machinery is being added to this company's plant, near Silverton, to enable it to handle 400 tons of crude ore per 24 hours.

Ledge Mining & Milling Co.—The new mill of this company, near Silverton, will be started as soon as the water supply will permit.

Henrietta.—Work has been started with 20 men on this mine, near Silverton, owned by the San Juan Mining, Smelting & Refining Co. A 5,000-ft. Bleichert tramway was completed last fall, connecting the mine with the Gladstone Northern railroad. The 150-ton copper matte

smelter, owned by the company, it is reported, will be started April 15.

Rockwood Light, Power & Transportation Co.—The affairs of this company are reported straightened out and it is said the management expects, within the next 30 days, to resume work on its power plant at Rockwood, which is intended to furnish electric power to all the mines of this and adjoining counties, and electric lights for several towns.

Silverton Mining Co.—The mill of this company is completed and ready to start.

Sunnyside.—A power drill plant will be erected at these mines, near Silverton, shortly, by J. H. Terry, manager and owner.

SAN MIGUEL COUNTY.

(*From Our Special Correspondent.*)

All the mines in the district are adding to their working forces. The Alta and the Nellie are running at full capacity, and their manager, A. C. Koch, and Cooper Anderson, speak encouragingly of the outlook. The other mines are working with about 75% of the usual force.

A discovery of a large body of lead corbonate is reported on the Picayune, Fraction and Golden Rule claims at Sawpit, by James Blake, otherwise known as "The Father of Sawpit." Little is known as yet as to the actual extent of the ore body. Mr. Blake is preparing to sack ore and ship to the Smuggler-Union mill. Great interest has been aroused at Sawpit over the find.

SUMMIT COUNTY.

Carbonate.—Moon, Weaver & Kearse, working this mine on Mount Baldy, have started a stope on an 18-in. streak of lead ore said to run $60 to $80 per ton. At 300 ft. from the tunnel mouth an air-shaft is being driven up.

Jesse.—This group and 40-stamp mill in Gold Run, near Breckenridge, which have been leased to T. R. Griffith and associates for 18 months, has 10 men getting out ore for a 200-ton test run.

TELLER COUNTY—CRIPPLE CREEK.

(*From Our Special Correspondent.*)

Dexter.—Considerable ore is being shipped from this property on Bull hill by the leasing company. New machinery has been installed and a new shaft house erected.

E. F. C.—This claim, belonging to a company of the same name, controlled by the Woods Investment Co., has been leased. It is on Galena hill, north of any finds of ore previously. The showing is said to be good.

Henry Adney.—Good ore has been found on this claim on Beacon hill on the extension of one of the C. K. & N. veins. Lessee Mike Burke and associates have a bond on the property. An ore house is being erected. Beacon hill is at present one of the most prosperous parts of the district.

Isabella Gold Mining Co.—A small force is busy on this property under lessees Hamlin and Murphy. It is understood that the lease has between two and three years to run. The company's affairs are handled by the directors of the Isabella Mines Co., which owns the stock of the old Isabella company. E. C. Babbitt of Cripple Creek is in charge for the company and L. S. Grant for the lessees.

Stratton's Cripple Creek Mining & Development Co.—Considerable property on Gold and Globe hills is worked under lease; only one lease has been granted on Bull hill, that on the main workings of the Zenobia, which does not belong to the Stratton company, but the Stratton estate owns the bulk of the stock. It is rumored that the Bull hill property is to be sold to an eastern syndicate.

IDAHO.

BLAINE COUNTY.

Improved Mineral Smelter Co.—This company, of Portland, Ore., it is reported, is to build a 100-ton smelter at Bellevue, to reduce the ores of the Wood River district. It is the intention of the company to have the smelter in operation by May 1.

Queen of the Hills.—This silver mine in the Wood river district, has been sold to N. Treweek and Irvin E. Rockwell, president and general manager of the Minnie mine near by. W. A. Stanton is general manager.

CUSTER COUNTY.

White Knob Copper Co., Ltd.—At a special meeting of the stockholders of this company, held March 2, it was voted to authorize an issue of $1,000,000 first mortgage 6% 10-year sinking fund gold bonds, convertible at par into the capital stock of the company. To carry out this plan, it was also voted to increase the capital stock from 200,000 shares to 260,000 shares of $10 each. The bonds are to be issued in part in exchange for or to provide for the redemption of the present outstanding issue of the company's debenture bonds, and the balance to be sold to provide working capital. The property of the company is at Mackay.

IDAHO COUNTY.

Crackerjack.—A 100-h. p. electric plant has been installed by this company at Hump, and is driving the air compressor and the 10-stamp mill. Two power drills have recently been installed, enabling drifting to progress 12 to 15 ft. per day.

McKinley.—A contract was recently let to drift 150 ft. upon the ledge in the lower tunnel. The ledge is reported 24 ft. wide. The claims are on Salmon river, above White Bird. The stock is controlled by men in Kellogg.

SHOSHONE COUNTY.

New Jersey Gold Mining & Milling Co.—This company, working about two miles above Wardner, has closed down, after working six months, owing to failure to save the values. At first an electrical treatment was installed, it is reported, but it did not prove successful and was discarded. After a series of experiments, another system was installed. A flume was built from Elk creek, three miles, to the mill, the ore being transported to the mill by a gravity tramway.

Nine-Mile Mining Co.—Under the management of Ole Linn this company resumed operations with seven men, after six months' idleness. The properties are on Nine-Mile creek, above Wallace. Over 2,200 ft. of tunnel work has been done on the six claims.

Tarbox Mining Co.—An upraise is to be driven on the ledge from the 400-ft. to the 200-ft. level at this property, near Wallace. Considerable other development work is also mapped out. A double compartment shaft has been sunk 400 ft., and several drifts driven 300 ft. each, so that the total amount of work amounts to about 2,000 ft. The mine is well equipped with machinery and is in charge of John Waters.

WASHINGTON COUNTY.

The smelter at Mineral is reported in operation. Many improvements have been made in the method of handling ore and waste.

MICHIGAN.

IRON—MARQUETTE RANGE.

Penn Iron Mining Co.—A steel shaft house will be erected by this company at its Republic mine, of its standard type.

Red Rock.—Work still continues at this exploration four miles north of Amasa. Some lean ore has been met with.

(*From Our Special Correspondent.*)

M. L. Fay and W. C. Yawkey, who have been exploring with diamond drill and hand work near the old Taylor mine, have stopped work. Their drill has been taken by the Bessemer Iron Co., which is exploring adjoining lands, and the latter is now operating two machines upon part of its holdings, with excellent success, so it is stated. One of these drills has cut more than 150 ft. of ore averaging about 55% iron and .05% phosphorus and still in ore. A number of men are at work test pitting the company's lands. The company has several tracts under option for purchase and in all controls almost 100,000 acres in that part of Baraga county, close to L'Anse.

IRON—MENOMINEE RANGE.

Cuff.—Extensive development work has been carried on at this property on section 6, 39-29, at Norway, with encouraging results. The work is being conducted by the Northern Iron Co.

Perkins.—The operations conducted by W. J. Turner at this mine, at Norway, are progressing steadily. The shaft is down 71 ft. below the first level and drifting to the south to strike the ore is now in progress.

Verona.—This mine at Vulcan, worked by Pickands, Mather & Co., has closed, and will not resume, as the company has an abundance of low-grade ore such as the Verona produces that can be mined to better advantage at its other mines.

MINNESOTA.

IRON—MESABI RANGE.

(*From Our Special Correspondent.*)

Albany.—Work is to resume at this mine, Hibbing district, in about 10 days. It is a shipper to the Lackawanna Steel Company.

International Harvester Co.—Preliminary work at the Hawkins mine, on the western Mesabi, has begun, and the mine will be hoisting ore in due time. The company's Agnew has been stripping all winter with a small crew and will change its method of mining to milling during the coming season.

Interstate Iron Co.—This company, operating the Lincoln mine, has put on a larger force and will add to it until a full force is at work. An electric haulage plant will be installed at once. The mine has two shafts and is well equipped underground and on surface and produces a high grade of bessemer ore. It is the property of Jones & Laughlins, with Capt. Thos. Walters in general charge and C. T. Fairburn as manager. The company's Grant mines will not be operated this year.

Leonard Mining Co.—This company will resume stripping in a week or two, with one shovel. A large amount of work will be required to open this milling property properly, and to permit the shipments intended. The Leonard contains a large tonnage, which the Great Northern road is anxious to move prior to the expiration of its lease.

Oliver Iron Mining Co.—This company is operating only six of its mines in the Hibbing group this winter, these being the Day and Sellers, St. Clair, Glen, Clark and Chisholm. It is opening in the same district the Monroe and Howard and is exploring the Burt, in preparation for extending the stripping undertaken a year ago. Stripping operations at the Morris mine commenced last year under a contract that would have run over several seasons, will not be continued this year, and two shovels that have been at the mine are being moved to the Fayal, where stripping will be pushed forward faster than anticipated, and three or four shovels will be employed, commencing very soon. The Drake & Stratton Co., who have this contract, will operate eight shovels this year, at the Fayal, Leonard and Stevenson mines. The company's machine shops are now busy overhauling shovels and locomotives for the campaign.

Pickands, Mather & Co.—This firm is to reopen its Malta mine, at Sparta, and much larger shipments than in 1903 will be made this season. About 100 men will be employed within a month. The Malta has been idle since last June.

Republic Iron & Steel Co.—This company, operating several mines on the Mesabi this winter, is hoisting more ore than usual, and will have large stocks at the opening of navigation. It carried over much ore from last year also. The company has about 175,000 tons in stock on surface at its three operating properties at Virginia. Its Kinney is to re-open as soon as open pit mines can operate successfully. Its Wills will not mine anything this year.

Swallow & Hopkins.—Explorations in section 2, T. 58, R. 18, and in section 10, T. 58, R. 19, have been discontinued, the results being discouraging. Work continues, however, in section 10, T. 58, R. 16, though no important finds have been made. The mine in section 4, T. 58, R. 16, is being stripped and may produce up to 50,000 tons this year if a market can be found for the ore. Stripping has been under way all winter by hand, and a considerable ore area is now cleaned off. The stripping is understood to have cost less than the price that any contracting firm was willing to offer for the small job, 150,000 yd.

IRON—VERMILION RANGE.

(*From Our Special Correspondent.*)

White Iron Lake Iron Co.—This company, operating a drill on the shores of White Iron

lake, south of Ely, is getting a lot of magnetic ore, and samples from the drill look very good. The company claims to have more than 60 ft. of this ore. A hole is to be sunk 1,400 ft. Adjoining lands that are now being prospected show magnetic ore more or less clean, and it may be that there will be some activity in that section the coming season. Any quantity of magnetite can be found all through there, both as float and in place, but the large companies have not considered the location with especial favor and think the formation is thin and flat.

An island in Snowbank lake, just opened for settlement, has been filed upon by a Duluth land man, who will carry on extensive explorations for iron. The lake is in T 64, R 9, on the eastern Vermilion range, about 20 miles from Ely.

MONTANA.

LEWIS & CLARKE COUNTY.

(From Our Special Correspondent.)

Big Indian Mining Co.—President Masin will equip the 60-stamp mill with some form of table to save the sulphides. At present no attempt is made to save the concentrates.

East Helena Smelter.—Three furnaces of the four at the works are in blast. These are each treating 180 tons per 24 hours. The crucible of each furnace is 36 by 144 in. The charge is mixed in a charging car holding about two tons, and is fed automatically. The slag is handled by a small Porter saddle tank locomotive.

Whitlach Mining Co.—Martin & Carroll, of Helena, have the active management of this company, and intend to drive all machinery at the mines electrically, including hoist, compressor and pumps. The old incline shaft on the Owyhee claim will be utilized at first, the drift at the bottom cleaned out, and a new shaft raised to the surface.

MISSOULA COUNTY.

(From Our Special Correspondent.)

Duquesne Mining Co.—This company which purchased last season the Rock Island mine in the Saltese mining district, announces that it will have 50 mines at work as soon as supplies can be hauled in.

SILVER BOW COUNTY.

Hecla Consolidated Mining Co.—Newton Todd, of Indianapolis, has brought suit for a receiver against this company, making charges which are denied by the president, Henry Kruppenberg. The mine is at Melrose, and has paid $2,500,000 in dividends; the last dividend being $30,000 in 1901.

Minnie Healy.—A cave-in occurred at this mine February 26, killing five men. The jury at the inquest returned a verdict stating that the accident was entirely unavoidable and unforeseen.

(From Our Special Correspondent.)

Several small plants are along the Silver Bow creek, in the vicinity of the old tailings piles of Butte, deposited from the concentrating mills. These plants consist of vats, or flumes through which water from the creek flows. Old iron and scrap tin are placed in the flumes. The precipitates are metallic copper.

Belmont.—The Butte agency of the Sullivan Machinery Co., is placing a 15 drill Sullivan cross compound compressor on this property, which is one of the Heinze group. It is the purpose to open up this claim to a greater depth than any mine in the vicinity. The present shaft, now about 500 ft. deep will be sunk to 1,200 ft.

Gold Hill Mining & Milling Co.—This company, organized to take over the properties belonging to the estate of G. W. Beal et al., near the head of German gulch, is capitalized at $2,500,000 in $5 shares. The property consists of quartz claims, placer claims and several water rights, and has been held by the Beal family for many years. The placer has been worked continuously for 25 years, the felsite porphyry, which decomposes by exposure to atmospheric influences, being piped off from year to year, and the free gold recovered in sluice boxes. The new owners will develop the property as a quartz mine, and it is understood will erect a mill of 100 stamps or more, the mill treatment to include cyanidation. It is understood that the heirs to the Beal Estate retain large holdings. Perry H. Beal has been designated as the agent in Montana.

Iduna.—This copper property has been leased by Shackleton & Whiteway, who are sinking the shaft into new ground from the 200 ft. level. The claim is in the southeastern part of Butte. Two patents, one for quartz, and the other as placer are in evidence, covering the same ground in part.

NEW JERSEY.

WARREN COUNTY.

Montgomery Gold Leaf Gold Mining Co.—A 200-ton plant, it is reported, will be erected by this company on its 1,600-acre tract in Pahaquarry township, near Belvidere. The plant, it is stated, will treat the rock mined, which is said to contain 3% copper. H. H. Deshler, of Belvidere, is named as the prime mover in the company.

NEW MEXICO.

SOCORRO COUNTY.

Mogollon Gold & Copper Co.—This company controls 26 claims in the Mogollon mountains, near Cooney. A 550-ft. shaft and about 3,000 ft. of drifts are completed on the Cooney group. The high-grade ores are now hauled 85 miles to Silver City, at a cost of $10 per ton. The lower grade ore is treated at the 70-ton concentrating plant on the property, making a 10 to 1 product. The mill is equipped with two sets 8 by 24 Allis & Chalmers rolls, three Wilfley tables, seven 6-ft. Frue vanners, one 3.5-ft. Huntington mill, Allis & Chalmers, and one 3-ft. Huntington mill, Mine & Smelter Co. A large Dodge crusher, 11 by 15, was recently added. An 80-h.-p. Allis & Chalmers engine runs the mill plant. Water power is said to be used about seven months in the year, 30-h.-p. being generated by a large Pelton wheel. A saw mill of 5,000 ft. daily capacity is also run by water power. The sinking plant on the Cooney consists of a Hendrie & Bolthoff quadruple flat-friction hoist and three boilers, one 65-h.p. Allis & Chalmers, one 60-h.p. Hendrie & Bolthoff and one of 85-h.p. from the Mine & Smelter Supply Co. A 10-drill Sullivan compressor and two Cameron sinking pumps are in use. The old stopes in the mine are now being cleaned out and a second hoist in a lower station will be used in sinking. Thomas J. Curran, of Albuquerque, N. M., is president of the company, and W. J. Weatherly is manager. About 125 men are employed.

OREGON.

BAKER COUNTY.

United Exploration Co.—This company, of Sumpter, has ordered an electric hoisting plant from the Allis-Chalmers Co., with a sinking capacity of 2,000 ft.

GRANT COUNTY.

Copperopolis.—A body of high-grade copper ore is reported in this mine, near Prairie City, and arrangements for a plant are said to be in progress. W. W. Gibbs is superintendent.

JOSEPHINE COUNTY.

American Gold Fields Co.—This company, working near Grant's Pass, has just installed an Ingersoll-Sergeant air compressor.

Greenback.—This mine, at Greenback, is reported to have 40 stamps dropping and to have a 150-ton cyanide plant at work. C. W. Thompson is manager and employs about 100 men.

Waldo Smelting & Mining Co.—This company has announced that it will build a 100-ton smelter this summer at its mines in the Waldo district, 40 miles from Grant's Pass. The mines are said to be well developed and to show much copper ore. Chas. L. Tutt is president and manager.

PENNSYLVANIA.

ANTHRACITE COAL.

A number of collieries at Tamaqua and Mahanoy City have been forced to suspend operations owing to the floods.

Cameron.—The fire at this colliery, at Shamokin, is believed to be extinguished.

Marion Coal Co.—This company, in which William P. Boland and Edward S. Williams, of Scranton, are interested, has purchased the Holden culm dump at Taylor from the Lackawanna Railroad Co, and will build a washery with a capacity of 1,000 tons of prepared coal a day, employing nearly 100 men. The Holden dump was purchased recently and is estimated to contain 750,000 tons of coal.

Potts.—The mine fire which broke out at this colliery and was thought to have been extinguished, has broken out afresh. The level will probably be flooded to stop the flames.

SOUTH DAKOTA.

CUSTER COUNTY.

(From Our Special Correspondent.)

Clara Belle Mining Co.—A vein at 225 ft. has widened 6 ft. A large quantity of ore is on the dump ready for milling, and a two-stamp Tremaine mill is on the ground. Frank Hebert, of Custer, S. D., is in charge.

London & Dakota Group.—At the bottom of the 70-ft. shaft an 8-ft. vein has been penetrated, containing gold, silver and lead.

Mile High Gold Mining Co.—This company's property is seven miles northwest of Custer. W. R. Millham, of Custer, is in charge.

LAWRENCE COUNTY.

(From Our Special Correspondent.)

Buxton and Big Bonanza.—The new cyanide plant built by John Lundberg, J. V. N. Dorr and A. D. Wilson, is treating from 50 to 75 tons of ore a day. Power is obtained from the Belt Electric Light & Power Co. at Lead, S. D., with three motors in the mill. Ore is pulverized by a Chilean mill. A 1,200-ft. aerial rope tramway delivers ore from the Big Bonanza mine across Nevada gulch, while Buxton ore is trammed directly into the bins at the top of the hill. The Moore slimes process is used.

Capital City Gold Mining Co.—A new hoisting plant has been ordered for the ground along upper Deadwood gulch. C. P. Ames, of Central City, is manager, and John Harrop, of Lincoln, Neb., is president.

Dakota Gold Mining & Milling Co.—The deep snow in the mining region has forced the mill to suspend.

Eleventh Hour Group.—John Madill, principal owner, recently shipped 70 tons of ore to the Imperial cyanide plant at Deadwood. The group lies on the west side of Spearfish cañon.

Golden Crest Mining Co.—Ore is reported in the main shaft. The shaft is equipped with a hoist, and ore will be mined for the mill, which is running one shift.

Imperial Gold Mining Co.—The cyanide plant at Deadwood started work February 20. Two new tunnels are under way and 14 men are employed.

Reliance Gold Mining Co.—At a special stockholders' meeting held at Deadwood, the issuance of $250,000 in 7% bonds was ratified. It is said upwards of $50,000 have so far been subscribed for. The proceeds are to be used for building the new cyanide mill.

PENNINGTON COUNTY.

(From Our Special Correspondent.)

Black Hills Copper Co.—Work has been suspended owing to the inability of the pump to handle the water. The drift on the 800-ft. level is now 130 ft. long and, according to surface measurement, within 18 ft. of the main ledge.

Burlington Gold Mining Co.—The shaft is 107 ft. deep. A. D. Arundel is superintendent. Hoisting is done with a windlass.

Empire State Gold Mining Co.—J. B. Safford, manager, of Hill City, says the 5-stamp mill will be started in the spring.

Golden West Mining Co.—Ore is being blocked out on the Benedict group. E. J. Kennedy is secretary and manager, at Rochford.

Tycoon Mining Co.—Work is resumed at the Lucky Boy claim.

UTAH.

BEAVER COUNTY.

(*From Our Special Correspondent.*)

Erie Copper Co.—A contract has been let for 50 ft. of drifting on the 250-ft. level. Considerable native copper is coming in.

BOX ELDER COUNTY.

(*From Our Special Correspondent.*)

Century.—This property, in Park valley, is 25 miles from Kelton, the nearest railroad station. Several adits have been driven and considerable drifting on the vein done from a winze sunk 80 ft. below the lowest adit. A 16-stamp mill is handling from 50 to 60 tons of ore per day, with a 40-mesh battery screen. The ore is practically free-milling gold, three tables saving a small amount of concentrates. The ore age value of the ore is given as $8 per ton. P. W. Madsen is president.

JUAB COUNTY.

(*From Our Special Correspondent.*)

Tintic Ore Shipments.—During the week ending March 4, 147 car loads were shipped to the Salt Lake smelters, as follows: Ajax, 5; Bullion-Beck, 7; Centennial-Eureka, 43; Carisa, 5; Dragon Iron, 13; Gemini, 27; Grand Central, 16; La Clede, 1; Lower Mammoth, 7; South Swansea, 1; Salvator, 1; Tetro, 2; Victor Con., 7; Uncle Sam Con. crude, 5, concentrates, 2; Yankee Con., 4.

SALT LAKE COUNTY.

(*From Our Special Correspondent.*)

Bingham Consolidated Smelter.—From this plant about 182,000 lb. of copper bullion was shipped during the week ending March 4.

Utah Consolidated Smelter.—Shipments of copper bullion during the week ending March 4 aggregated 301,500 lb.

United States Smelter.—The copper bullion shipments for the week ending March 4 aggregated 236,908 lb.

Yampa.—This mine, in the vicinity of the Highland Boy, is on Carr fork, which drains into Bingham cañon. The property is worked through the Craig tunnel, which, starting on Carr fork, runs westerly 3,248 ft., striking the main vein at 2,200 ft. in, and thence running on the vein. At 2,448 ft. in the tunnel connects with a 1,700-ft. incline from the surface on the vein. There are seven levels from the incline, from which the bulk of the shipments come. A skip, operated by an air hoist, takes the ore from the stations on the incline to the tunnel level. The Yampa tunnel intersects the incline at 475 ft., and then runs about 1,000 ft. on the vein. Ore from the Yampa tunnel is sent down the incline to the Craig tunnel. A track of 35-lb. rails leads to loading bins on the Copper Belt railroad, the cars, holding nearly 5 tons each, are to be hauled by a gasoline locomotive. Two Imperial Rand compressors, having a capacity of 7 to 10 drills, supply the drills. J. W. Craig is superintendent.

SUMMIT COUNTY.

(*From Our Special Correspondent.*)

J. I. C.—This property was closed recently, pending the formation of a new company.

California.—A sheriff's deed has been delivered to W. W. Armstrong, cashier of the First National Bank, of Park City, in satisfaction of debts aggregating nearly $30,000.

Wabash.—This property has 25 men busy. Development is progressing on the 600 and 800-ft. levels from the 800-ft. shaft. The equipment includes steam hoist, air-compressor, etc. N. Treweek is manager.

TOOELE COUNTY.

(*From Our Special Correspondent.*)

Buckhorn.—This property is to be equipped with a mill this year. It is operated by the Western Exploration Co., of which W. F. Snyder of Salt Lake City is manager.

Consolidated Mercur.—Manager G. H. Dern states that the installation of the Moore slimes process has cost $55,000, about $40,000 more than had been anticipated. There has been no shortage of ore, but the grade has averaged lower.

Honerine West Mining Co.—With 23 lode mining claims as a basis, this company has been formed with a capital of $2,500,000. B. F. Bauer is president and treasurer, and F. C. Richmond, of Salt Lake City, secretary.

Utah.—A contract with the American Smelting & Refining Co. for the output of this mine for a period of two years has been signed.

UTAH COUNTY.

(*From Our Special Correspondent.*)

Ozokerite Mines.—The Summit Placer Mining Co., of New York, which purchased the Ozokerite property of R. J. Kroupa, of Provo, has a 150-ft. shaft and drifts, and a reduction plant consisting of crushers, bins and vats with screw conveyors. The material is melted by hot water, the mineral wax skimmed off, remelted, refined and shipped in 10-lb. cakes. Mr. Kroupa, who is chemist for the company, reports that about 120 tons of ozokerite have been shipped from the mine now idle, in charge of T. P. Rigney, of Soldiers' Summit. The shaft will be sunk to a greater depth.

WASHINGTON.

FERRY COUNTY.

(*From Our Special Correspondent.*)

Knob Hill.—The raise is within 15 ft. of the surface stopes. After holing through the lessees expect to increase their ore shipments.

Pearl Consolidated Mining Co.—The Lone Pine shaft is down 48 ft. The cross-cut from No. 2 vein, 56 ft., is finished, and a raise is being carried up to meet the shaft. A steam boiler, engine and pump has been received and will be installed immediately. About 25 men are employed.

Republic Ore Shipments.—During the week ending March 5, the Mountain Lion shipped 330 tons, Knob Hill 60 and Zala M. 60.

Zala M.—Ore is being stoped on the 350-ft. level. No dead work will be done while the ore teams can be kept on the road hauling. Nine men are employed.

FOREIGN MINING NEWS.

AFRICA.

NATAL.

The Mines Department reports the total production of coal in the month of December as 68,358 tons. The total number of men employed was 107 whites, 2,795 negroes and 1,618 East Indians. In December, 1902, the output was 45,251 tons. The coal exported for the month was 2,030 tons, in addition to which 25,861 tons were sold to steamers in the port of Durban.

CANADA.

BRITISH COLUMBIA—BOUNDARY DISTRICT.

Boundary Ore Shipments.—For the week ending February 27 shipments aggregated 17,856 tons, as follows: Granby, 12,600; Mother Lode, 3,870; Emma, 99; Oro Denoro, 891; Senator, 264; Athelstan-Jack Pot, 132; total for the year to date, 134,819 tons.

British Columbia Copper Co., Ltd.—President Underwood, of this company, reports the contemplated merger between the British Columbia and the Snowshoe companies has been declared off because the Snowshoe management did not meet the requirements deemed necessary by the British Columbia directors. The scheme called for the organization of an English company with £1,000,000 capital, divided into £1 shares.

BRITISH COLUMBIA—YALE DISTRICT.

Kamloops Mines, Ltd.—The Ashanti Lands, Ltd., has decided to take up its option with the British Columbia Exploration Syndicate, whereby it acquires the Iron Mask and other claims at Kamloops and five claims on the coast, all of which are crown-granted. The Ashanti Lands floated a new company called the Kamloops Mines, Ltd., with a capital of $750,000. The Iron Mask at Kamloops is the best known claim acquired. There a shaft has been sunk to a depth of 500 ft. and it is declared that 62,000 tons of ore are in sight. A concentrating plant is to be installed on the Kamloops property capable of treating 50,000 tons per annum. There are no founders' shares, the vendors selling their property entirely for shares, and £20,000 is set apart for working capital. The issue consisted of 150,000 shares, at par, and 300 6% debentures of £100 each, offered at 50% discount. The first directors of the new company are G. T. Symons, C. E. Bulling, E. V. Marment, E. P. Milsted and C. E. Tempest.

MINING STOCKS.

(Full quotations given on pages 425 and 426.)

New York, Mar. 9.

Interest in the stock market is lagging. Dealings in the coppers are of small volume, and the fluctuations in prices are so narrow as to suggest professional manipulation. Amalgamated, after touching $47.375, gradually weakened to $45.375, while Anaconda sold only 100 shares at $15.50. White Knob, of Idaho, exhibited strength above $8, apparently because the bond issue has been ratified unanimously. Incidentally stockholders voted to increase the capital stock from 200,000 shares to 260,000, par $10, as the $1,000,000 new bonds are convertible into stock at par. Greene Consolidated, of Mexico, has advanced to $10.75 as a result of the improvement in its copper output. Certain brokers, both here and in Boston, are attempting to increase public interest in this stock, their favorite method being a statistical comparison of Greene with Amalgamated.

British Columbia has recovered to $3.25. Stockholders have recalled their vote on the consolidation scheme, as the directors contend that the Snowshoe Co. failed to meet certain essential requirements which would have been advantageous to the B. C. shareholders.

Forty shares of George A. Treadwell Mining Co., of Arizona, were reported sold on curb at $7.25—$1.25 less than the company asked recently.

Ontario Silver, of Utah, made a sale at $4.35, showing weakness.

The Cripple Creek Colo., gold shares are quietly firm. Portland sold at $1.90, and Elkton Consolidated up to 72c.

In the Comstock group Ophir has just paid its third dividend of 25c. this year. The stock changed hands at $4.90@$5. Mexican went to $2.10, Consolidated California & Virginia to $1.60, and Confidence to $1.15. Hale & Norcross fell 10c. to 88c., and Union Consolidated 2c. to 88c.

Recent auction sales were 5,000 shares Sutro Tunnel Co., 190 shares Germania Smelting & Refining Works, and 10 shares Vanderbilt Steel & Iron Co., of Princeton, N. J., and Birmingham, Ala., at $8 for the lot.

Boston. Mar. 8.

(*From Our Special Correspondent.*)

Apathy is the only word that describes this market, and copper shares continue to be badly neglected, with extremely small changes. A significant fact, however, is that such specialties as Copper Range Consolidated, Utah Consolidated, Centennial and one or two others are well taken when offered. Notwithstanding the extreme dullness, an optimistic feeling prevails and it would not be surprising if a better market came with spring weather. The continuation of the strike at the Copper Range properties is taking more or less income from the company, and were there any market it would be felt in that direction. The stock touched $41.50, but settled close to $40 to-day. Osceola was offered down to $55.50, but recovered to $57, with no news to affect the price one way or the other. Utah Consolidated continues to be absorbed and closed strong at $34.25.

Dominion Coal broke $3 to $52 on limited dealings, with a $2 recovery. The offerings are reported to have come from Canada. According to reports, this company will probably make an issue of 5% bonds to retire the present 6's and the preferred stock. Dominion iron is also lower at $7.75. Daly-West is a trifle more active around $34.25. Any offerings of Wolverine find ready takers at slightly better prices, to-day's quotation being $74. It touched $75 last week. Parrot is off $1 to $22.37½, with very little doing. A report that this company had turned over $1,000,000 to the Amalgamated Company under the recent de-

cision, can hardly be true, as the minority stockholders have not received any dividend and they would have to be reckoned with. Tamarack has been very dull at $95.

Colorado Springs. Mar. 4.

(From Our Special Correspondent.)

The market on the local exchange during the current week has been exceptionally strong, and the lookout for advances in the immediate future is encouraging. Elkton and El Paso led the list with daily advances, while many other stocks advanced fractionally. All producers in the Cripple Creek district of any note are shipping more ore than for many months past, and their showing is very gratifying. The production of the camp for the month of March should equal if not exceed any month in its history, as the rich strikes recently made are now having their effect on the returns of the mills and smelters. The water question is becoming less troublesome, and the future of the district now seems promising.

The production for the month of February was $1,700,000, only about $50,000 less than January, notwithstanding the shortness of the month.

San Francisco. Mar. 3.

(From Our Special Correspondent.)

The market for the Comstocks has been quiet for most of the week, and prices somewhat easier. Sales have fallen off from the rush of two or three weeks ago, but business is still showing up very fairly.

Some quotations noted are: Ophir, $4.75@$4.90; Mexican, $1.75@$1.80; Consolidated California & Virginia, $1.60@$1.65; Caledonia, $1.20; Savage, 58c.; Sierra Nevada, 55c.; Yellow Jacket, 47c.; Gould & Curry, 44c. per share.

The agreement recently entered into between 25 Comstock mining companies and the Comstock Tunnel Co. provides in part that the Comstock mining companies shall advance the sum of $18,200, to be used in making repairs in the main Sutro tunnel and lateral branches as specified in a report made by Leon M. Hall, filed January 18, 1904. The Comstock Tunnel Co. agrees that not more than one-sixth of the royalties hereafter coming due from mining companies for ore extracted shall be retained by the tunnel company.

The installation of a powerful electric pumping plant in the Union shaft, on the Comstock, is likely to follow the completion of repairs down to the 2,000-ft. level, corresponding with the 2,150 of the C. & C. shaft. The plans include the installation of four plants along the lode, one at the Union, that now in operation at the C. & C. shaft, another at the Ward, and still another at the Forman shaft.

On the San Francisco & Tonopah exchange dealings were very fair and values generally steady. Montana Tonopah sold at $1.25; Tonopah Belmont, 60@65c.; Tonopah Midway, 38c.; Evelyn, 32c. Business improved towards the close.

On the California exchange a good deal of activity was shown in oil stocks, and prices were generally very fair. One sale of Hanford was noted at $140. Some other quotations were: Kern oil, $4.90@$5; Sovereign, 49c.; Oil City, 30@32c.; Toltec, 19c. per share.

San Luis Potosi. Mar. 1.

(From Our Special Correspondent.)

Exchange on New York advanced again from 212 to 216. The Mexican government has announced that 220, the minimum limit under the law, will be the basis for duties on articles imported during March, though the average for February on New York was 216. This latter figure, however, will be used by the government this month in its gold purchases.

Mining stocks continue in bad shape. Buen Despacho, of El Oro, brought $44; Aldebarón, $45; La Union, $55; Victoria, $175@$166; Dos Estrellas, $1,700@$1,610; La Paz, of Matehuala, $163@$155; Providencia, San Felipe, Gto., $62@$60; San Rafael, of Pachuca, $660; Santa Gertrudis, $85, and the Rosario, of Oaxaca, $12.

COAL TRADE REVIEW.

New York, Mar. 9.

ANTHRACITE.

The wholesale market for antharcite continues active all over the country, and the output this month will undoubtedly be up to the average for March. Every spell of warmer weather checks retail buying, but enough raw and blustering weather may be expected to prevent any great falling off for 10 days yet. Ports long ice bound are opening, but the coastwise movement of coal is restricted by high winds keeping vessels at anchor. The floods in the anthracite regions have done less damage than was feared, and, so far as known, none of the roads has traffic interrupted between the mining region and tidewater, though individual mines may be cut off. The ice in the Lehigh river went out quickly, and both the Lehigh Valley and the Central Railroad of New Jersey are now running trains. At the mines, floods have stopped work at many mines, but the thaw did not last long enough to cause great damage. The gorges in the Susquehanna above Sunbury remain a menace, but, though the Delaware, Lackawanna & Western and other roads had their tracks along the river blocked with ice in places, the actual damage to tracks has not been great.

There is some talk of a possible change in the existing plan of naming discounts of 50c. per ton on April 1, but it is largely newspaper talk, and now that the labor situation in the bituminous regions is less threatening, and a long suspension of mining there is hardly probable, there is good reason to believe that the usual discounts will be named April 1.

The movement of coal in the Northwest has been impeded by storms, but demand has been active. Supplies on the docks are lessening, and some docks are out of various sizes and grades, but in the aggregate there will be coal enough to last till the opening of navigation. In Chicago territory the scare over the possible strike of bituminous miners put up the price for bituminous coal and had a sympathetic affect on the anthracite market, leading to considerable buying. The receipt of anthracite by rail, which improved for several days as railroads dug out and forwarded their side-tracked cars, has fallen off again from interruptions along the lines caused by freshets. Along the lower lakes and in Canadian territory the railroads have not been able to straighten out the tangles due to cars being side-tracked by snowstorms, and the short-lived freshets did not improve the situation. There is still a great demand from Canada, and with the railroads able to give much better service it will be some time before this demand is fully supplied. The Atlantic seaboard trade is about as good as it has been for some time past. A few days of warmer weather cut down buying, but high winds have increased demand. Wholesale trade continues good, particularly at points beyond Cape Cod, where numerous dealers are already in need. Some of the small ice-bound ports in particular are short of coal and are trying to get in supplies by vessel to the nearest open port and thence by rail. Owing to the slow coastwise movement of coal it is altogether probable that such ports will not be able to get coal enough to satisfy them for another month. At New York harbor ports demand is seasonably good and the steam sizes continue to sell freely.

BITUMINOUS.

The Atlantic seaboard bituminous trade continues active, with coal in short supply. Prices have gone higher, the current price for Clearfield grades being $3@$3.15, f. o. b. New York harbor shipping port. Very little coal is in sight for sale at those prices. Transportation on all the main line roads is very poor, due to freshets caused by ice gorges. The supply of cars at the mines is restricted by the same causes, and as there are no signs of a sufficient supply of cars arriving at the mines to supply the orders in producers' hands, higher prices are probable.

There is some diversity of opinion regarding the labor outlook at the mines, but the action taken at Indianapolis indicates a compromise and not a strike. It is likely that Clearfield operators will secure a slight reduction in mining prices, although a stiff contest is expected.

The through freight rates, which will be the same as last year, are about as follows: From Clearfield, Meyersdale and Beeck Creek regions to Philadelphia, for points beyond the Capes, $1.25 per ton, and points inside, $1.20; to New York harbor shipping port, $1.50; from the Georges Creek region to Philadelphia, $1.35; New York harbor shipping port, $1.65; from the Westmoreland and West Virginia regions, to Philadelphia, $1.45@$1.50, and to New York harbor shipping port, $1.75.

The market in the far East shows an active demand; consumers are not able to get coal from the firms that regularly supply them, and orders are coming from consumers who put in their usual supply of coal last fall, expecting it to last till the end of April. Along Long Island sound demand is large and no one consumer can apparently get enough. Those who a month or six weeks ago said they had coal enough to last till April are now anxious to get more. As regards New York harbor points, there is no coal of importance at tidewater or on the way to supply the active demand. In all-rail territory, demand is active and increasing, new and additional orders coming in daily.

Transportation from the mines to tidewater is poor and irregular. Car supply at the mines, owing to freshets, is very poor, indeed. It is now but 25% of the demand, with the probability of its being less. In the coastwise vessel market vessels are scarce; captains apparently have decided to stay in port until the prevailing high winds subside, Philadelphia and Baltimore are now practically free of ice. The current rate from Philadelphia and Chesapeake Bay ports is $1 to Sound ports and $1.10 to ports beyond Cape Cod.

Birmingham. Mar. 7.

(From Our Special Correspondent.)

The coal production in Alabama continues heavy, with a good demand for all that is being mined. The coal miners in this State belonging to the United Mine Workers of America were notified again the last of the past week that there would be no change in mining wage for the month of March, the minimum wage of 47½c. per ton being in effect.

The Sloss-Sheffield Steel & Iron Co. is rebuilding the coal washer destroyed by fire a few weeks ago in Sleepy Hollow, near Blossburg, in Jefferson county.

Printed reports of the State Mine Inspector for the year.—As has been given before, the coal production in 1903 amounted to 11,700,753 tons, against 10,329,479 tons in 1902. There are 135 different places in Alabama producing coal, with between 150 and 175 mines in operation. Chief Mine Inspector J. M. Gray is confident that the production in 1904 will go above 13,000,000 tons, provided there is no labor trouble during the summer.

Chicago. Mar. 7.

(From Our Special Correspondent.)

The Chicago market is in a state of uncertainty, awaiting the result of the Indianapolis convention. If the decision of the miners shall be to strike, there can be no doubt but there will be a general rushing of bituminous to Chicago, with the accompaniment of high prices. It will take two or three weeks to get a decision on this matter, and meanwhile the market will be extraordinarily sensitive. Illinois and Indiana producers of coal naturally hope for a decision in favor of the new and slightly lower wage scale offered. They realize that the fight is one between the eastern and the western producers of bituminous, with the advantage at present largely in favor of the East, as regards cost of production. It is figured that the increases in wages for the miners of bituminous coal in the last six years have amounted to 90%, while the proposed reduction amounts to only about 5.55%. Under these circumstances the hope is expressed by leading Chicago dealers that the miners will see the justice and the expediency of the small reduction proposed.

Dealers in smokeless are hopeful that the situation will result in an opportunity to improve greatly their market here. For a year smokeless has not been selling well, but with the production stopped from western mines, it naturally would forge ahead tremendously. In the last week smokeless has not changed materially,

minimum quotations for Pocahontas and New River being $3.25@$3.60 for run-of-mine. Hocking sells well at $3.40@$3.90 for run-of-mine, and prepared sizes 20@25c. higher; the demand is steady and large. Illinois and Indiana are in better demand, and run-of-mine brings $2.30 @$2.90, with screenings at $1.70@$1.90. The demand for bituminous has not fallen off in the week and bids fair to increase with the uncertainty about supplies after April 1. Youghiogheny is in light demand, at $3.30@$3.50.

Anthracite continues active. Though warm weather continues over the Middle West, sales are heavy for the season, pointing to the dependence of the country territory on Chicago for the rest of the season. Complains about all-rail delays continue, and the all-rail part of the trade grows in importance daily. There is a probability that the spring price will be considerably lower than the $6 base price of last spring, and indications are that $5.50 will be established. Much independent coal has been in the market for the past winter, with the result that the $6.50 rate was more than once in danger of falling.

Pittsburg. Mar. 8.

(From Our Special Correspondent.)

Coal.—The threatened strike of bituminous coal miners may be averted. At the joint convention, in session all of last week at Indianapolis, the operators receded from their position and offered a compromise. They had been firm for the scale of 1902, based on a rate of 80c. a ton for screened coal, while the miners insisted on a continuation of the present scale, which calls for 90c. The compromise offer was for a rate of 85c. and a contract extending over a period of two years, instead of one year, from April 1. The miners' convention would not accept the proposition, although advised to do so by the leaders, and at the session yesterday it was decided to leave the matter to a referendum vote. All mines are to be closed on the afternoon of March 15, when the votes will be cast by the miners in the competitive districts. The ballots will be counted by the regular tellers at Indianapolis on March 17. If the vote is favorable to the compromise proposition the committee authorized by the operators will go to Indianapolis on March 21 and sign the scale. The Pittsburg district operators seem confident that the terms will be accepted. The high water in the rivers will enable the coal concerns to ship several million bushels of coal to the lower ports this week. Shipments began yesterday, when a number of large tows went out.

Connellsville Coke.—The coke market is very active, although the production was a trifle over 200,000 tons, a slight decrease from the previous week. The shipments, however, were greater. Prices are firmer, furnace coke being quoted at $1.65@$1.75 for the strictly Connellsville grade, and $2.25@$2.50 for foundry coke. The shipments aggregated 8,017 cars, compared with 7,713 the previous week, distributed as follows: To Pittsburg and river tipples, 3,400 cars; to points west of Pittsburg, 3,447 cars; to points east of Everson, 1,170 cars.

San Francisco. Mar. 3.

(From Our Special Correspondent.)

Mr. J. W. Harrison's circular of this date says: "Since the last circular there has been but one arrival of coal from Australia, with 547 tons of coal, and 2,282 tons of coke. Within the past two months, we have but two arrivals of colonial coal, amounting to 3,747 tons, hence the stock of Australian on hand has materially diminished, in fact there are absolutely no Australian steam grades whatever in first hands. If it were not for the liberal arrivals of Coast coal, there would have been a marked advance in values, but with fuel oil as a competitor there is no noticeable change in price. There are at present reported on the chartered list to load coal from Newcastle 16 vessels with a carrying capacity of about 39,000 tons, and some of these will not arrive here before the latter part of this year, hence colonial coal is only a small factor in establishing local values. Almost all the transportation from our northern collieries is being done by steam, at low rates of freight, so that the future grades of foreign fuel will be best adapted for domestic uses only, and British Columbia and Washington will provide about all that is utilized for steam. We have had a succession of rain storms locally for the past several weeks, which has called into requisition an increased consumption of fuel for house purposes."

Pacific coast coals in large lots to dealers are quoted as follows: Wellington and New Wellington, $8; Richmond, $7.50; Roslyn, $7; Seattle and Bryant, $6.50; Beaver Hill and Coss Bay, $5.50; white ash, $5.25. For Rocky mountain coals, ex-car, to dealers, prices are $14 for Colorado anthracite, $11.50 for Castle Gate, Clear Creek, Rock Springs and Sunnyside. Eastern coal is still nominal at $14 for Pennsylvania anthracite, and $13 for Cumberland, with very light stocks. Foreign coal in cargo lots is quoted at $13 for Welsh anthracite, $8.50 for cannel, $7.50 for Wallsend and Brymbo.

Foreign Coal Trade. Mar. 9.

There is nothing new to report in the export trade here, which continues light.

The total production of coal in France in 1903 is reported at 35,003,000 metric tons, against 29,997,000 tons in 1902, showing an increase of 5,006,000.

Imports of fuel into France for the year were as follows in metric tons:

	1902.	1903.	Changes.
Coal	11,856,795	11,208,460	D. 648,335
Coke	1,280,755	1,521,550	I. 240,795
Briquettes	503,746	628,190	I. 124,444
Totals	13,641,296	13,358,200	D. 283,096

Of the coal imports in 1903 only 1,000 tons were from the United States, against 32,419 tons in 1902.

Exports of fuel from France for the year were as follows, in metric tons:

	1902.	1903.	Changes.
Coal	821,823	938,470	I. 116,647
Coke	81,906	106,330	I. 24,424
Briquettes	102,905	70,790	D. 32,115
Totals	1,006,634	1,115,590	I. 108,956

The consumption of bunker coal and briquettes by French ships in 1903 were 1,078,500 tons, of which 157,000 tons were briquettes. In 1902 this consumption was 1,008,600 tons, of which 149,000 tons were briquettes. Bunker coal shipments for foreign ships were 334,000 tons in 1903, and 285,000 tons in 1902.

Messrs. Hull, Blyth & Co., of London and Cardiff, report, under date of February 27, that the continued demand for best coals for the Far East is having its effect in prices, bests being very firm, while other qualities steady. Quotations are: Best Welsh steam coal, $3.84; seconds, $3.72; thirds, $3.60; dry coals, $3.60; best Monmouthshire, $3.36; seconds, $3; best small steam coal, $2.04; seconds, $1.80; other sorts, $1.62.

The above prices for Cardiff coal are all f. o. b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are f. o. b. Newport, both exclusive of wharfage, but inclusive of export duty, and are for cash in 30 days, less 2½% discount.

The freight market has been very active, and the tone firmer. Some rates quoted from Cardiff are: Marseilles, $1.40; Genoa, $1.50; Naples, $1.41; Las Palmas, $1.44; St. Vincent, $1.56; Rio, $2.22; Santos, $2.52; Buenos Aires, $1.77.

IRON TRADE REVIEW.

New York, Mar. 9.

The iron market continues in a somewhat uncertain condition, although signs of improvement are manifest here and there. The large purchases of bessemer pig from outside furnaces by the United States Steel Corporation tended to steady the market somewhat—as they were doubtless intended to do. On the other hand, the southern iron men, after standing out a short time for a basis of $10 for No. 2 foundry, have dropped back to $9.50, and even in some cases it is reported, to $9.25, Birmingham. At these prices a pretty heavy tonnage has been sold; but the action has tended to unsettle the market again and to induce consumers to look for still further concessions.

The question of lake ore prices for the season is still unsettled, the adjourned conference in New York failed to reach an agreement. It is reported that the independent producers will not agree upon prices, unless they have some guarantee that the Steel Corporation will restrict its sales of ore to outside parties. It begins to look very much as though there would be an open market.

In finished material there has been a better business in some lines, notably in bars and sheets. Plates and structural shapes are very quiet. It has been reported that some large orders for bridge-building material will be placed soon, but they have not made their appearance up to date. The business in bars, above noted, has been so good that some mills are withdrawing the concessions recently offered.

Upon the whole, the trade is looking a little better, but it is hardly safe yet to talk of any decided improvement.

Birmingham. Mar. 7.

(From Our Special Correspondent.)

Southern pig iron manufacturers feel much more encouraged this week over market conditions, though there are no better prices prevailing. There is a happy demand for iron, and since March 1 there has been sold enough iron to cover the production for the next two months. There is a healthy inquiry still on. No. 2 foundry has been selling at $9.25; however, it is understood that some manufacturers have decided to ask for $9.50, and perhaps $9.75 before the end of next week. In the South there is some trouble, caused by a shortage of cars with the railroads. Railroad officials assert that they are leaving no stone unturned to handle the business as promptly as possible.

The following quotations are now given: No. 1 foundry, $9.50@$9.75; No. 2 foundry, $9.25@$9.50; No. 3 foundry, $9; No. 4, foundry, $8.50@$8.75; gray forge, $8.25@$8.50; No. 1 soft, $9.50@$9.75; No. 2 soft, $9.25@ $9.50.

The production in Alabama is holding up well. The next furnace to be blown in will be the No. 1 furnace at Thomas, near here, belonging to the Republic Iron and Steel Co. This furnace is now being dried out after a thorough repairing, practically rebuilding. It will have a daily output of about 200 tons. W. H. Hassinger, vice-president and southern manager of the Republic Co., was in Chicago during the past week attending a meeting of the company.

Finished iron and steel shows no improvement. In steel there is activity, the plant of the Tennessee Coal, Iron & Railroad Co., at Ensley, working steadily on steel rail orders received some time ago.

President Schuler, of the Alabama Steel & Wire Co., whose headquarters are in Gadsden, Ala., was in Birmingham during the past week, and when asked as to the steel rod, wire and nail mills at Ensley, said that in all probability the plant would not start up until the company was making its own steel at Gadsden, statements to the contrary notwithstanding. Work on the steel plant at Gadsden is being pushed right along, and there are prospects of the same being able to manufacture steel by June. Cast iron pipe makers report active trade with a number of good orders on hand.

The quarterly meeting of the Sloss-Sheffield Steel & Iron Co., will take place this week in New York. The earnings (net) of the company amounted to over $249,000 for the quarter. Out of this sum will be paid interest, taxes and dividend on preferred stock, 1.75%, amounting to $174,000, leaving a balance of $75,000 to go to the surplus.

Chicago. Mar. 7.

(From Our Special Correspondent.),

The large sale of iron to the United States Steel Corporation has resulted in the loosening of the market somewhat in the last week. Both orders and inquiries have been more numerous, and the situation is decidedly better for sellers of northern. The prospects are, indeed, that the northern market is destined to be firmly on its feet before the southern market attains that

happy end. Southern is now acknowledged to be down to $9, Birmingham, on the largest orders, or $12.50, Chicago. Despite this fact, northern seems to be in the lead as regards demand, at $13.50 minimum for No. 2. Difficulty in transportation has had something to do with the preference for northern over southern, but the chief reason seems to be the growing need of northern for mixtures.

In general the signs are cheering to the seller, despite the holding down of prices. Production is now on a better basis, and buyers have come to the point where they realize the need of buying fairly heavily to cover their needs up to six months ahead of their purchases. Despite the political disturbances to trade always likely in a Presidential election year, everything now indicates a slow rise of the market.

Coke is abundant and weak. Any quantity of 72-hour foundry can be had at the Frick basic price of $2.50 at the ovens, or $5.15 Chicago, with this price shaded by as much as 25c. on sales forced by demurrages.

Cleveland. Mar. 7.

(From Our Special Correspondent.)

Iron Ore.—Awaiting advices from another conference between the producing-consuming and the merchant ore interests in session in New York to-day, there is little to record in the ore situation. Following the failure of the conference in this city a week ago, the United States Steel Corporation, together with other interests concerned in both the production and consumption of Lake Superior ores, took hasty action looking towards further negotiations, and the result is now looked for with interest. Committees representing the two sides upon the question of the price of ores have taken up the matter where results seemed impossible in open conference. In the matter of price, both have made concessions and it seems that, with only a matter of 15 to 20c. difference, an adjustment would be probable were it not for other factors in the situation, and which it is now believed are engrossing the attention of the committees. In the meantime there will be no contracting until the matter of prices is definitely settled.

Pig Iron.—A better inquiry is reported, and the effects of the order placed a week ago by the Steel Corporation for bessemer pig at Valley furnaces is plainly evident. While the actual orders show a gratifying increase, the best evidences of bottom prices and a freer movement are seen in the inquiries received. The entry of the leading interests into the market for bessemer pig divulges the fact that their stocks in central districts are low, and the fact that the corporation has not hesitated to protect its position against the future has had an excellent effect upon the trade at large. It would cost the steel corporation about $2.40 to ship pig from their Illinois stacks to central plants, as against a nominal charge for transportation from the Valley furnaces to their mills. The fact that their Ohio and Pennsylvania stacks, now in blast, are not sufficient to fill requirements in this district is a sufficient stimulant to those who have deferred buying. No. 2 Northern is quoted at $13.25@$13.75 Cleveland, with Southern No. 2 at $13.50@$13.75 nominal, the latter being still out of this market, although some further reduction in freight rates has been talked of.

Finished Material.—A good movement in steel bars continues, with prices steady. Manufacturers have been able to advance prices on iron bars to the basis of $1.35 Pittsburg, an advance of 9½c. in this market. The trade is broadening, and in many lines there is less disposition upon the part of independent manufacturers to cut prices. This is noticeable in sheets, which are a shade firmer. There are good prospects for an early resumption of activity in structural material.

New York. Mar. 9.

Pig Iron.—The local market remains quiet, with buying of a hand-to-mouth order. We quote at tidewater as follows: No. 1 X foundry, $15.30; No. 2 X, $14.25@$14.75; No. 2 plain can be had for $1 less; while gray forge is selling around $13.25. For southern irons on dock quotations are: No. 1 foundry, $13.50; No. 2 foundry, $13; with lower grades in proportion. No. 1 soft can be had at about $13.50, and No. 2 soft at $13.

Bar Iron and Steel.—Refined bars are quoted at around 1.45c., in large lots, with steel at about the same. Common iron bars are as low as 1.30c.

Plates.—The only large order in sight is that of the Staten Island ferryboats. A New York yard will probably build the boats. Sheared plates are quoted as follows: Tank, 1¼-in. and heavier, 1.76@1.80c.; flange, 1.95@2.05c.; marine, 2.10@2.15c.

Steel Rails.—The quotations remain $28 for standard sections, f. o. b. mills; light rails, $33 @$36, according to weight.

Structural Material—The local demand remains slack. Large lots at tidewater are still quoted at 1.75@2c. for beams, angles and channels.

Philadelphia. Mar. 9.

(From Our Special Correspondent.)

Pig Iron.—Our eastern pig iron makers are still in the drags and are unable to report any improvement in demand. The reason is that the recent action of the southern makers has unsettled confidence at a time when everybody thought the iron market had finally settled down to its lowest point. There are rumors here this week that the large sales of southern iron were made at cut rates, and our people are inclined to doubt the correctness of the report that southern iron is being advanced. Propositions made a week or ten days ago to consumers in this territory have not been withdrawn. Pig iron has been offered from the south at $9.25 for No. 2. We are on the point of closing a good deal of business in basic iron, and the only point to be settled is the amount to be taken. Some little charcoal iron has been coming in, and forge has also begun to move, but in a small way and only to cover actual wants. Buyers of bessemer iron are once more back in the market, but up to present writing no actual transactions have been closed. There is a stronger undertone to the entire market and our furnace agents believe that the long period of depression has now reached its limits. Quotations for pig iron may be given about as follows: No. 1 X foundry, $15.50; No. 2 X, $14.50; No. 2 plain, $14; No. 2 southern by rail, $13.50@$14; on dock, $13@$13.50; standard forge iron, good brands, is held to-day at $14.

Billets.—The activity in inquiry for material into which billets enter has stimulated inquiry and agents of billet mills are now too busy to talk in arranging terms of sale for quite an amount which they decline to state.

The arrangements are such that buyers are protected against any cut in prices. The average selling price, delivered, is $24.50. A good supply of orders is in plain sight.

Bar Iron.—Refined iron has begun to move in a regular way. The average quotations for refined iron are about 1.40 delivered; steel bars, 1.45@1.50.

Sheets.—The tone of the sheet market is strong and the larger consumers who have been awaiting developments for several months are now buying with more liberality. The card rates remain where they were, and the retail demand is quite active.

Pipes and Tubes.—The most careful inquiry shows that the same conditions prevail and that manufacturers are not offering concessions.

Merchant Steel.—The general market is backward, and while all of our plants are fairly busy, there is no inclination to purchase heavily.

Plates.—There has been quite an active demand during the past few days by small consumers, who are taking boiler plate. Bridge material is attracting very little attention.

Old Rails.—The holders of old rails appear to be indifferent whether they sell or not. Some parties who have had a good deal of stuff which they were ready to sell a month ago have put up prices 50c.

Scrap.—All kinds of scrap are slightly higher. Parties who control heavy steel scrap are offerings to furnish it at $13.50. Railroad scrap has all been bought up, and dealers are offering to take orders to deliver at $17. The same applies to country scrap, delivery price being $15.

Pittsburg. Mar. 8.

(From Our Special Correspondent.)

The premature announcement that the United States Steel Corporation had placed a large order for pig iron with outside furnace interests led to the circulation of several reports as to the amount purchased. As the Corporation still adheres to its policy of not making public affairs of this kind, it was not possible to obtain an official confirmation of any of the reports, all of which now seem to have been greatly exaggerated. It was learned today on reliable authority that the Corporation actually bought 50,000 tons of bessemer pig iron for March delivery at $13, Valley furnaces, of which 35,000 tons were placed with the Bessemer Furnace Association and 15,000 tons with W. P. Snyder & Co. It also took options on 35,000 tons with these interests for April delivery at the same price, the option expiring on Thursday of this week. An option on 35,000 tons for May delivery also was taken, the price being the same and the option to expire on April 10. While the tonnage under negotiation was given out as actual sales, the sales of pig iron during the past 10 days did reach the amount first mentioned, but not all was taken by the steel corporation. A number of important sales to outside interests had been made, but not announced. It developed to-day that from 50,000 to 60,000 tons of bessemer pig iron were sold at prices ranging from $13 to $13.25, Valley furnaces. Just before the announcement was made that the corporation had entered the market a lot of 3,000 tons had been sold at $12.75, Valley furnaces, and some at $13. Since then sales have not been made under $13.15. The purchase has had a remarkably stimulating effect on the iron and steel markets and the outlook to-day is brighter than it has been for several months. Some large inquiries are being made for pig iron and several large contracts are likely to be closed before the end of another week. The sensational reports from New York that the Republic Iron & Steel Co. had purchased 300,000 tons of pig iron are entirely incorrect. So large a deal would have been known at once in iron circles in the Pittsburg district. It is possible the grounds for the report was a deal made about three months ago with a Youngstown concern by which it receives pig iron in exchange for skelp, but the tonnage would not amount to 100,000 tons in the entire year. The official statement given out by J. G. Butler, Jr., chairman of the Bessemer Pig Iron Association, for March is as follows: "Reports from 163 furnaces, with a daily capacity of 45,800 tons, in the central west, including the Pennsylvania Steel Co., the Mahoning and Shenango Valley districts, indicate that on March 1 133 stacks were in blast and 30 out of blast. The active capacity was 72% and the idle capacity 28 per cent."

One of the interesting features of the iron and steel industry this week was the announcement that orders have been given by the receivers of the Clairton Steel Co. to put furnace No. 1 in shape for resuming at the earliest possible date. It was blown out in January and had been in operation since April 21 of last year. The starting of this furnace is regarded as a positive indication of an improvement in the steel trade. There has been no important sale of bessemer or open-hearth billets and sheet bars, but the pool price is firmly maintained. Inquiries for steel bars and plates are increasing and a number of good orders have been booked during the week. Reports of several large steel rail orders are being circulated, but official announcement of big contracts have not been made. The operation of the iron and steel plants in the Pittsburg district has been greatly interfered with through the inability of the railroads to handle the freight due to the floods. Some of the mills have been forced to close for several days on account of the high water in the rivers.

Another meeting of the general advisory board of the Amalgamated Association of Iron, Steel & Tin Workers began here yesterday. It was called as a result of the dissatisfaction expressed by tinplate workers over the decision

prohibiting members from entering into profit sharing arrangements with independent tin-plate concerns. Some of the lodges insist that a special convention be held in order that relief may be afforded to the independent manufacturers who are unable to pay the Amalgamated scale and compete with the American Sheet and Tin-Plate Co. at the ruling price of $3.45 a box. But few of the independent plants are in operation, while the leading interest is running nearly all of its mills and is accumulating heavy stocks of tin-plate.

The advance in prices of wire products expected to be ordered by the American Steel & Wire Co. for over a month has just been announced. The increase is $1 a ton, fixing the minimum price of wire nails at $1.90 a keg and the price of plain wire at 1.80c. a pound. These are the prices established by the Pittsburg Steel Co. over a month ago.

Pig Iron.—In addition to the purchase by the United States Steel Corporation sales of bessemer pig iron have been made to outside steel interests aggregating nearly 60,000 tons. The prices ranged from $12.75 to $13.25, Valley furnaces, but it is impossible now to do better than $13.15. No. 2 foundry iron is firmer owing to the heavy sales of bessemer iron, and the lowest quotation is $13.35, Pittsburg. Gray forge is still quoted at $12.75, Pittsburg. It is reported that a Youngstown concern has bought 2,000 tons of southern forge at $11.75 delivered. This rate is equal to $7.80, Birmingham, or $12.15, Pittsburg.

Steel.—Several small sales of bessemer and open-hearth billets are reported at the pool price of $23, and all shading of this price seems to have stopped. Some nice orders for steel bars have been placed at 1.30c., and the indications are that this rate will be advanced during the coming week. Plates are active and firm at 1.60c.

Sheets.—The market continues irregular, and concessions from the fixed price are reported. The leading interest continues to quote No. 28 gauge black sheets at 2.30c. and galvanized at 3.30c.

Ferro-manganese.—The market is unchanged, and both foreign and domestic 80% is quoted at $41.25@$42.25.

Cartagena, Spain. Feb. 20.

(Special Report of Barrington & Holt.)

Iron and Manganiferous Ores.—Shipments reported are 2,600 tons dry ore to Glasgow and 2 cargoes, 9,200 tons manganiferous ore, to Rotterdam. Sales are much better and prices show signs of improvement. Miners, however, are holding out for still higher prices.

Current quotations for iron ore are: Ordinary 50% ore, 6s. 6d.@6s. 9d.; special low phosphorus, 7s.@7s. 6d.; specular ore, 58% iron, 9s.; magnetic ore, 60%, 11s. 3d. for lumps and 9s. 3d. for smalls. Manganiferous ores range from 14s. 3d. for 20% iron and 20% manganese down to 9s. 3d. for 35% iron and 12% manganese.

Pyrites.—Iron pyrites, 40% iron and 43% sulphur, are quoted at 10s. 3d. per ton.

CHEMICALS AND MINERALS.

New York, Mar. 9.

Spring trade is developing, and the continued improvement in transportation facilities gives encouragement to merchants. In certain branches, notably those catering to the fertilizer industry, which is favored by the high price for cotton, this will prove a better year than last. Already substantial orders have been booked, and with few exceptions sellers hold for an advance in price.

The Pennsylvania Salt Manufacturing Co., paying 12% in dividends annually, has decided to increase its capital from $3,000,000 to $4,000,000. This is the pioneer concern in the heavy chemical industry in this country. Twenty thousand new shares, par $50, will be issued to stockholders at $75 in the proportion of one new share to three held. Payment will be made in three instalments of $25 each—May 2, 1904, September 1, 1904, and January 3, 1905, when the new certificates will be issued. The Nichols Chemical Co. has bought a tract of land for $42,500 adjoining its Laurel Hill, Long Island, property. This land will be used for enlarging the chemical works, part of the General Chemical Co.

The first quarterly dividend of 1.25% on the $25,000,000 preferred stock of the E. I. Dupont de Nemours Co., the powder consolidation, will be paid on April 15. About the same time, it is reported, the initial dividend of 2.5% will be paid on the $9,000,000 common stock of the International Smokeless Powder & Chemical Co., whose shares are nearly all owned by the Dupont combination.

Alum is reported to have been discovered near Glendale, Colo., by E. L. Kelso, of Beaver Creek, Colo.

Work has been begun on an extensive glass sand deposit at Layland, O., by the Layland Sand & Stone Co.

At the recent solicitation of tenders by the government for supplying 150,000 bbl. portland cement for the Tonto basin dam, near Phoenix, Ariz., some very low bids were made. This work is of such importance that the government required a bond of 50% of the contract, and requested a retainer of 20% on each payment until the contract had been fulfilled satisfactorily. The lowest bid was made by the Portland Cement Co., of Denver, which offered to supply the cement at the dam site at $4.81 per bbl. under the provisions of the specifications, or for $4.52 if full payment is made promptly. Other bidders were the Iola Portland Cement Co., of Iola, Kas., $5.49 per bbl. delivered, and the Pacific Portland Cement Co., of San Francisco, Cal., $5.70 per bbl. The Atlas Portland Cement Co., of New York, if the unusual conditions had not been imposed by the government, would have offered to supply the cement at Mesa or Globe, Ariz., from its mills at Hamilton, Mo., at $3.35 in wooden barrels, or $2.96 in duck bags.

Exporters will be interested to learn that the new Colombian tariff of October 31, 1903, places a duty of 1c. gold per kg. on crude and refined sulphur, sulphuric acid, potassium and sodium bromide, bleaching powder, hyposulphite of soda, carbonate of soda, caustic soda, phosphate of lime, copper sulphate, all mineral fertilizer ingredients, blasting powder, and dynamite.

Cuban tariff rates were revised on February 5 as follows: An increase of 20% on imports of earths employed in manufactures and arts, including lime and gypsum; cement; tar and mineral pitch, asphalt, bitumen and shists; petroleum; zinc, lead and other metals, not specially mentioned, and their alloys. An increase of 35% is asked on sulphur, bromine, boron, iodine and phosphorus (excepting phosphorus for making matches, which is dutiable according to the previous tariff rate), organic salts; alkaloids and other salts; chlorides of gold and silver; gunpowder and explosives; miners' fuses; alcohol.

Abroad the chemical trade in February was rather unsatisfactory. An exception was copper sulphate, which continued strong on a good export demand. A scarcity of raw material favorably affected the price of carbonate and caustic potash, especially Montreal potash, which is in short supply.

The German potash works are still wrangling with the question of quotas, the newer plants contending against the older ones, whose temper has been quickened by the repeated reduction in their output to facilitate the operations of the syndicate. It is also intimated that the Virginia-Carolina Chemical Co., owner of a potash plant and one of the largest consumers in the world, is not a silent spectator. As regards the possible dissolution of the Kali syndicate, opinions differ.

Cyanide.—Small shipments are being made to Mexico. Imports are less frequent, although British quote f. o. b. export port 8d. (16c.) per lb. At New York sellers ask 19@20c., but a shade less would likely be accepted from a large consumer.

Bleaching Powder.—Ordinarily this is the busiest season for importers, at least as far as imports are concerned. Doubtless many recognize this, and among them are jobbers who otherwise would not hesitate to undersell importers. Momentarily prime British and American bleach is quoted at $1.25 per 100 lb., and Continental, $1.20@$1.25, according to seller.

Copper Sulphate.—Exporters are hustling, though it is not likely that they will soon recoup the markets lost in competition with foreign makers. At home domestic makers quoted $5.05@$5.10 per 100 lb., but jobbers would likely shade these figures.

Arsenic.—Arrivals in February were somewhat less than January, but as consumers are well supplied no apprehension is felt by importers, who quote 3.125@3.25c. per lb.

Acids.—Market conditions are pretty good, considering the interrupted traffic of late. Prices continue nominally unchanged.

We quote as below per 100 lb., unless otherwise specified, for large lots in carboys or bulk (in tank cars), delivered in New York and vicinity.

Muriatic, 18°	$1.50	Oxalic, com'l.	$5.00@$5.25
Muriatic, 20°	1.60	Sulphuric, 50°,	
Muriatic, 22°	1.75	bulk, ton	13.50@14.50
Nitric, 36°	4.50	Sulphuric, 60°	1.05
Nitric, 38°	4.75	bulk, ton	18.00@20.00
Nitric, 40°	5.00	Sulphuric, 66°	1.20
Nitric, 42°	5.50	bulk, ton	21.00@23.00

Brimstone.—Uninterestingly quiet. Best unmixed seconds are quoted at $22 per ton for shipments, while thirds are about 75c. less. Reports from the Pacific coast state that a new deposit of sulphur, near McKittrick, Cal., is to be developed by J. F. Keller and associates, of San Pedro, Cal. Another enterprise is the projected sulphur works by the San Francisco Sulphur Co. The Stauffer Chemical Co., of Oakland, Cal., is also contemplating substantial improvements on its pyrite property.

Exports of brimstone from Sicily in January were 39,455 tons, being somewhat larger than the two previous months. Of this quantity 13,859 tons went to the United States, 12,743 tons to France, and the balance to other countries. Stocks at seaboard in Sicily on January 31 were the second largest on record, amounting to 362,265 tons, held principally at Girgenti and Licata.

Pyrites.—Inquiries are more frequent, and some good business is expected soon to materialize, on basis of current quotations. Iron pyrites deposits in Clay county, Ala., will be operated by a new fertilizer concern, the Alabama Phosphate Co., capitalized at $450,000.

We quote domestic pyrites $5 per ton for lump ore, f. o. b. Atlantic coast mines, and 9c. per unit for fines; sulphur content varies from 42@44%. Spanish pyrites, carrying from 46@52% sulphur, are quoted at 11@11.5c. per unit for lump, and 9.5@10c. for fines, delivered at Atlantic ports.

Nitrate of Soda.—Prices are higher. Nearby arrivals have sold at $2.17 per 100 lb.; March, $2.15; April to September, $2.125; October to December, $2.10. Refined quality is scarce, and the coast market is particularly strong.

In ratifying the proposal to increase the borrowing powers of the directors of the Colorado Nitrate Co., recently, it was announced that the new ground purchased in Tarapaca, Chile, consisted of over 1,100 acres. According to experts there was in reserve over 5,000,000 qtl. of nitrate of soda, and at the present price a profit of £500,000 ($2,500,000) would be realized.

The Santa Catalina Nitrate Co. has declared a first quarterly dividend of 3% from this year's profits.

Messrs. Mortimer & Wisner's monthly statement of nitrate of soda, dated New York, March 1, gives the following statistics, in tons:

	1904.	1903.	1902.
Imported into Atlantic ports from West Coast, S. A. from Jan. 1 to date	49,260	33,193	22,587
Stock in store and afloat, Mar. 1, in New York	1,700	980	....
Boston	800	2,000	....
Philadelphia	2,400	....	9,334
Baltimore	....	400	....
Norfolk, Va.	....	800	....
To arrive, due June 15	76,100	69,120	36,666
Visible supply to June 15	81,000	73,280	46,000
Stock on hand Jan. 1	8,100	7,800	10,000
Deliveries past month	27,879	17,525	6,933
Deliveries since Jan. 1 to date	52,460	36,833	23,587
Total yearly deliveries	....	229,589	179,613
Prices current, March 1	2.12½@2.15c.	2⅛c.	2¼c.

It is noteworthy that deliveries this year are 15,627 tons greater than 1903.

Saltpeter.—Consumption shows an improvement, 9,611 bags being used in January and February, leaving 1,257 bags stock on hand March 1. Expected arrivals in this country amount to 14,809 bags, making the visible supply March 1, 16,066 bags, as against 15,772

bags last year. Crude saltpeter holds at $3.50@$3.55 per 100 lb., and refined $4@$4.50.

Sulphate of Ammonia.—Continued good deliveries to the South presage firmer prices. Just now gas liquor ammonia is worth $3.175@$3.20 per 100 lb., according to time of delivery.

Phosphates.—Heavy cotton planting, coupled with an increase in other agricultural centers, has created good prospects for business in phosphates this year. Evidence that the fertilizer industry will be exceptionally active is the incorporation of new manufacturing companies, and the purchase of phosphate land in Tennessee by the Jarecki Chemical Co., of Ohio, and others. The Tennessee Phosphate Co. is improving its property in and around Mt. Pleasant. In Florida interest is centered in the recent consolidations. Some apprehension is felt by independent miners over the acquisition of railway facilities by the larger concerns. J. Buttgenbach & Co., as a result of its affiliation with the Dunnellon Phosphate Co., will now ship over the Dunnellon road to Port Inglis. This port is becoming more and more important, and from its opening in September, 1902, to December 31, 1903, it shipped 108,048 tons high-grade Florida rock.

Abroad sellers of Florida rock are soliciting prompt business at a shade less than 1905, believing ocean freights will advance next year.

Current ocean freight rates are about as follows:

	Shipping ports— Florida.	So. Carolina.	Algeria.
Baltic	$3.24@$3.36	$2.26	....
Continental.	2.76@ 3.00	....	2.16@ 2.22
Mediterranean	3.36@ 3.60	....	1.80
United Kingdom..	2.64@ 3.12	2.40@ 2.55	1.86@ 2.04

Prices for phosphates per ton are as follows:

Phosphates.	F. o. b.	C. i. f. Gt. Britain or Europe.
*Fla. hard rock, 77@80%....	$6.50@ 7.00	$9.84@$10.83
land pebble, 68@73%..	3.75@ 4.00	7.35@ 8.05
†Tenn, 78@80%.....	4.00@ 4.25	9.54@ 10.56
78%	3.75@ 4.00	.....
75%	3.25@ 3.50	.....
73@74%	2.95@ 3.20	.....
‡So. Car. land rock.....	3.25	.....
river rock, 55@60%.	2.75@ 3.00	5.75@ 6.88
Algerian 63@70%	.....	6.98@ 7.65
58@63%	.....	6.20@ 6.66
53@58%	.....	4.95@ 5.09
Tunis (Gafsa)	.....	6.05@ 6.65
Christmas Isle, 80@85%.....	.....	11.75@ 12.54
Ocean Isle, 82@88%.....	.....	12.11@ 13.60
Somme, Fr., 70@75%.....	.....	10.63@ 10.77
Bordeaux, Fr., 60@65%.....	.....	7.60@ 7.71
55@60%.....	.....	6.44@ 6.55
Liege, Bel., 60@65%.....	.....	7.07@ 7.17

* F. o. b. Florida or Georgia ports. † F. o. b. Mt. Pleasant. ‡On vessel, Ashley River, S. C.

Liverpool. Mar. 1.

(Special Report of Joseph P. Brunner & Co.)

Complaints of slack trade are pretty rife at present, but for most lines of heavy chemicals prices are well maintained.

Soda ash is firm. For tierces, nearest range is about as follows: Leblanc ash, 48%, £5@£5 10s.; 58%, £5 10s.@£6 per ton net cash. Ammonia ash, 48%, £4 5s.@£4 10s.; 58% £4 10s.@£4 15s. Bags, 5s. per ton under price for tierces. Soda crystals are in fair request at generally £3 7s. 6d. per ton, less 5% for barrels, or 7s. less for bags, with special terms for a few favored markets. Caustic soda is meeting with a moderate inquiry: 60%, £8 15s.; 70%, £9 15s.; 74%, £10 5s.; 76%, £10 10s. per ton, net cash. Special quotations for the Continent and a few other export quarters.

Bleaching powder export business is neglected, but quotations are unchanged at £4 5s.@£4 15s. per ton, net cash for hardwood packages, as to destination.

Chlorate of potash is idle at nominally 2⅜d.@2½d. per lb., net cash, for English make.

Bicarb. soda is selling at £6, 15s. per ton, less 2½% for the finest quality in 1 cwt. kegs, with usual allowances for larger packages; also special terms for a few favored markets.

Sulphate of ammonia is quiet at £12 15s.@£12 17s. 6d. per ton, less 2½% for good gray 24@25% in double bags f. o. b. here.

Nitrate of soda is in moderate supply on spot, and sellers are firm at £10 7s. 6d. per ton for ordinary quality, up to £10 12s. 6d. per ton for refined for double bags f. o. b. here, less 2½%.

METAL MARKET.

New York, March 9.

Gold and Silver Exports and Imports,

At all United States Ports in January and Year.

Metal	January.		Year.	
	1903.	1904.	1903.	1904.
Gold:				
Exports.	$85,951	$591,567	$85,951	$591,567
Imports.	2,010,851	8,225,508	2,010,851	8,225,508
Excess	I. $1,924,900	I. $7,633,941	I. $1,924,900	I. $7,633,941
Silver:				
Exports.	3,577,881	4,618,127	3,577,881	4,618,127
Imports.	1,494,556	2,609,372	1,494,556	2,609,372
Excess	E. $2,083,325	E. $2,008,755	E. $2,083,325	E. $2,008,755

These exports and imports cover the totals from all United States ports. The figures are furnished by the Bureau of Statistics of the Department of Commerce and Labor.

Gold and Silver Exports and Imports, New York.

For the week ending March 5 and for years from January 1.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week	$225,500	$115,910	$949,230	$4:247
1904.	1,359,160	1,383,654	8,640,945	166,449
1903.	757,933	1,137,408	3,607,978	144,751
1902.	8,799,924	511,107	7,941,090	134,000

General business is quiet, and there has been no special movement in the speculative markets. In some branches trade shows a little more activity.

The statement of the New York banks—including the 56 banks represented in the Clearing House—for the week ending March 5, gives the following totals, comparison being made with the corresponding week of 1903:

	1903.	1904.
Loans and discounts	$939,593,300	$999,918,400
Deposits	936,639,700	1,040,593,800
Circulation	42,919,500	39,169,500
Specie	168,658,600	219,192,400
Legal tenders	66,168,300	70,899,400
Total reserve	$234,826,900	$290,091,800
Legal requirements	234,159,925	260,148,450
Balance surplus	$666,975	$29,943,350

The following table shows the specie holdings of the leading banks of the world at the latest dates covered by their reports. The amounts are reduced to dollars and comparison is made with the holdings at the corresponding date last year:

	1903. Gold.	1903. Silver.	1904. Gold.	1904. Silver.
N. Y. Ass'd—	$168,658,600	——	$219,192,400	——
England—	177,807,085	——	175,318,395	——
France—	504,451,890	$218,851,155	467,599,220	$221,861,355
Germany—	170,190,000	59,795,000	173,395,000	60,925,000
Spain—	72,200,000	100,065,000	73,075,000	99,510,000
Netherlands—	23,492,500	33,022,000	27,193,000	33,279,000
Belgium—	15,673,335	7,836,665	15,506,665	7,753,335
Italy—	86,830,000	10,901,000	110,140,000	18,810,000
Russia—	392,910,000	38,780,000	460,410,000	39,120,000
Austria—	230,880,000	64,135,000	235,280,000	63,485,000

The returns of the Associated Banks of New York are of date of March 5, and the others March 3, as reported by the *Commercial and Financial Chronicle* cable. The New York banks do not report silver separately, but specie carried is chiefly gold. The Bank of England reports gold only.

The Treasury Department's estimate of the money in the United States on March 1 is as follows:

	In Treasury.	In Circulation.	Total.
Gold coin (including bullion in Treasury	$638,909,710	$236,241,028	$1,337,357,717
Gold certificates	462,206,979	.....	.....
Silver dollars ...	76,400,191	18,697,196	557,198,489
Silver certificates	462,101,102	.....	.....
Subsidiary silver	95,486,378	11,417,518	106,903,896
Treas. notes, 1890	14,780,933	65,067	14,846,000
U. S. notes.....	337,312,541	9,368,475	346,681,016
Cur. certificates.	.....	.....	.....
Nat. Bank notes	416,284,063	14,040,247	430,324,310
Total	$2,503,481,897	$298,829,531	$2,793,311,428

Population of the United States, March 1, 1904, estimated at 81,407,000; circulation per capita, $30.75. For redemption of outstanding certificates an exact equivalent in amount of the appropriate kinds of money is held in the Treasury, and is not included in the account of money held as assets of the Government. This statement of money held in the Treasury as assets of the Government does not include deposits of public money in national bank depositaries, to the credit of the Treasurer of the United States, and amounting to $154,807,347. The total amount in circulation shows an increase of $15,502,596 over February 1, and $149,485,567 on March 1, 1903.

The silver market is quiet, with 60-day futures selling at ⅝d. under prompt shipment. India is buying moderately, but the market shows no special feature of strength.

The United States Assay Office in New York reports receipts of 40,000 oz. silver for the week.

Shipments of silver from London to the East for the year up to February 25 are reported by Messrs. Pixley & Abell's circular as follows:

	1903.	1904.		Changes.
India	£1,429,300	£2,576,039	I.	£1,146,739
China	106,500	71,000	D.	35,500
Straits	99,491	58,103	D.	41,388
Total	£1,635,291	£2,705,142	I.	£1,069,851

Receipts for the week were £57,000 in bar silver from New York, £17,000 from the West Indies, and £15,000 from Australia; also £105,000 in Mexican dollars from the Straits; total, £194,000. Shipments were £112,800 in bar silver to Bombay, and £80,000 to China; also £6,500 in Mexican dollars to China; total, £119,300.

Indian exchange is a little easier, the exceptional demand for remittances having fallen off slightly. The Council bills offered in London, however, were all taken at an average of 16.09d. per rupee. Money is now reported quite plentiful in India. Shipments of silver have been somewhat lighter, owing to holidays in India and the present position in China.

Prices of Foreign Coins.

	Bid.	Asked
Mexican dollars	$0.45	$0.48½
Peruvian soles and Chinese pesos	.42	.45
Victoria sovereigns	4.85⅛	4.87
Twenty francs	3.85	3.87
Spanish 25 pesetas	4.78	4.82

OTHER METALS.

Daily Prices of Metals in New York.

March	Silver— New York, Cts.	Silver— London, Pence.	Copper— Lake, Cts. per lb.	Copper— Electrolytic, Cts. per lb.	Copper— London, £ per ton.	Tin, Cts. per lb.	Lead, Cts. per lb.	Spelter— N. Y., Cts. per lb.	Spelter— St. Louis, Cts. per lb.
3	57¾	26⅝	12¼@12⅜	12 @12⅛	56¼	28¼	4.45 @4 50	5.00	4.80
4	57⅜	26 7/16	12¼@12⅜	12 @12⅛	57	28	4.45 @4.50	5.00	4.80
5	57½	26⅛	12¼@12⅜	12 @12⅛	....	28	4.45 @4.50	5.00	4.80
7	57⅞	26 1/16	12¼@12⅜	12 @12⅛	56¾	28	4.45 @4.50	5.00	4.80
8	57⅞	26 1/16	12¼@12⅜	12 @12⅛	56¾	28	4.45 @4.50	5.00	4.80
9	57⅞	26 7/16	12¼@12¼	12 @12¼	57	27¾ @28	4.45 @4 50	5.00	4.80

London quotations are per long ton (2,240 lbs.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wire-bars: the price of electrolytic cathodes is usually 0.25c. lower than these figures

QUOTATIONS ON STERLING EXCHANGE.

March	3.....	4.865	March	7.....	4.865
"	4.....	4.865	"	8.....	4.865
"	5.....	4.865	"	4.....	4.865

Copper has ruled quiet, but steady, through the week, there being quite a strong undertone. The exports for the month of March are expected to be again rather heavy. The strike at the Lake mines continues and a settlement seems to be as far off as ever. The closing quotations are given as 12¼@12½c. for Lake; 12

@12¼c. for electrolytic copper in ingots, cakes and wirebars; 11¾@12c. in cathodes; 11¾@12c. for casting copper.

The market for standard copper in London closed last week at £57, opened on Monday at £56 15s., and the closing quotations on Wednesday are cabled at £57@£57 1s. 3d. for spot, £55 15s.@£55 16s. 3d. for three months.

Refined and manufactured sorts we quote: English tough, £59 5s.@£59 15s.; best selected, £60@£60 10s.; strong sheets, £70@£70 10s.; India sheets, £67@£67 10s.; yellow metal, 6¼@6⅜d.

Exports of copper from Atlantic ports for the week ending March 7 were 6,134 tons, principally to Great Britain and Germany. Imports were 552 tons from Mexico and Great Britain.

Tin has ruled quiet, but steady throughout the week, without any special feature. Consumers remain rather apathetic and only cover their immediate requirements. At the close, we quote spot at 27¼@28c.; futures, 27¼@27½c.

The foreign market, which closed last week at £123 15s., opened at the same figure on Monday, and the closing quotations on Wednesday are cabled at £123 15s.@£123 17s. 6d. for spot; £124@£124 2s. 6d. for three months.

Lead remains in good demand, and the market is very firm. The closing quotations are given as 4.45@4.50, New York; 4.37½@4.42½, St. Louis.

The foreign market developed considerable strength, Spanish lead being quoted as £12; English lead, £12 2s. 6d.

St. Louis Lead Market.—The John Wahl Commission Company telegraphs us as follows: Lead is strong at the late advance; 4.42½c. is the price for both argentiferous lead and Missouri brands.

Spanish Lead Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of February 20, that the price of silver during the week has been 15 reales per oz. Exchange is 34.97 pesetas to £1. Local quotation for pig lead has been 66.75 reales per quintal; equivalent, on current exchange, to £10 13s. 7d. per long ton, f. o. b. Cartagena. Exports have been 500,000 kg. to London, 30,000 kg. to Hamburg and 98,524 kg. to Marseilles, all desilverized.

Spelter is very firm at last week's quotations, 4.80 St. Louis, 5c. New York. There is a very good consumptive demand.

The foreign market is also firm, good ordinaries being quoted at £22 5s, specials £22 10s.

St. Louis Spelter Market.—The John Wahl Commission Company telegraphs us as follows: Spelter presents no novelty. The undercurrent continues strong. The latest sales reported are on a basis of 4.77½@4.80c., East St. Louis.

Spanish Zinc Ore Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of February 20, that prices are well maintained, and most of the mines are now at work. Freight rates are favorable. Blende, 35% zinc, is quoted at 65 fr., and calamine, 30% zinc, at 45 fr. per ton. Shipments for the week were 2,250 tons blende to Antwerp.

Antimony is quiet and unchanged. The ruling quotations are: 7¾@8c. for Cookson's; 6¾@7c. for Hallett's; 6⅜@6⅝c. for U. S., Japanese, Italian, French, Hungarian and Chinese.

Nickel.—The price is quoted by leading producers at 40@47c. per lb. for large quantities down to ton lots, acording to size and terms of order. The price for smaller lots, according to quantity, runs as high as 60c. per lb.

Platinum.—Demand continues steady, and the price is firm at $18.50 per oz.

Messrs. Eimer & Amend, of New York, quote prices for platinum in manufactured forms, as follows: Heavy sheet and rod, 72c. per gram; foil and wire, 75c. per gram; platinum crucibles and dishes, 77c. per gram; perforated wire, like cones, Gooch crucibles, etc., 82c. per gram.

Quicksilver.—The New York price is $45.50 per flask for large lots, while a slightly higher figure is quoted for smaller orders. The San Francisco quotations continue at $44@$45 per flask for domestic orders and about $41.50 for export. The London price is £8 5s. per flask, with the same quotation asked by second hands.

Cadmium.—According to Herr Paul Speier metallic cadmium was in good demand throughout 1903. Metal containing 99.5% cadmium sold at from 675 to 700 marks per 100 kg., delivered in Berlin.

Minor Metals and Alloys.—Wholesale prices, f. o. b. works, are as follows:

Aluminum	Per lb		Per lb
No. 1. 99% ingots	.33@37c.	Ferro-Tungsten (37%)	.38c.
No. 2. 90% ingots	.31@34c.	Magnesium, pure (N. Y.)	.60c.
Rolled Sheets	4c. up	Manganese	$2.75
Alum-bronze	.20@23c.	Mangan'e Cop. (20% Mn)	.32c.
Nickel-alum	.33@39c.	Mangan'e Cop. (30% Mn)	.38c.
Bismuth	$2.10	Molybdenum (Best)	$2.00
Chromium, pure (N. Y.)	.80c.	Phosphorus, foreign	.45c.
Copper, red oxide	.50c.	Phosphorus, American	.70c.
Ferro-Molybde'm (50%)	$1.25	Sodium metal	.50c.
Ferro-Titanium (10%)	.90c.	Tungsten (Best)	.88c.
Ferro-Titanium (20@25%) N. Y.	.55c.		

Variations in price depend chiefly on size of order.

Missouri Ore Market, March 5.

(From Our Special Correspondent.)

The high price for zinc remains at $38 per ton, but some of the buyers strained a point in advancing ore to $38 that has been selling along for several weeks at 50c. to $1 less than the top price. Although the week was one of exceptionally heavy buying, demonstrated by the large number of camps covered in search of ore, inability to secure cars for loading all the ore purchased leaves the report for the week's shipment 73 tons of zinc and 104 tons of lead less than the previous week. The assay basis price of zinc is stronger; that is, it is gradually advancing, as some ore that was selling on a $33 basis has been advanced to a $34 basis. In fact, only small lots of inferior ore are selling at less than a $34 basis, while a large quantity of ore is selling on a $35 basis. With a purchaser in the market this week for the rehabilitated coal smelter at Nevada, Mo., and prospects that buyers will be in the market at any time now for the new gas smelters building at Caney and Altoona, Kan., the present low state of the reserve stock makes it a shrewd move to secure as much ore ahead as possible, and this several of the buyers are now doing. At this time last year zinc ore advanced $4.50 in two weeks, going up to $40.50 per ton.

While the outside quotations on lead are $57 per ton, it is reported that as high as $57.50, and even $58 was paid during the week. A year ago lead was $51 per ton, advancing in one week to $58.50 per ton.

Following are the shipments of zinc and lead from 20 camps of the Joplin district, for the week:

	Zinc, lb.	Lead, lb.	Value.
Joplin	3,076,790	379,190	$66,185
Webb City-Carterville	2,254,280	280,460	44,060
Duenweg	966,980	264,050	24,445
Galena-Empire	861,960	153,640	18,165
Alba-Neck	783,260	18,340	15,725
Carthage	393,210	.....	7,075
Badger	335,760	10,910	6,355
Aurora	379,810	13,920	6,075
Granby	453,000	18,000	6,040
Carl Junction	258,350	5,760	4,940
Zincite	260,980	8,120	4,925
Oronogo	202,730	14,120	3,790
Cave Springs	155,120	18,220	3,155
Prosperity	154,230	.....	2,775
Reeds	155,840	.....	2,640
Mitchell	65,250	22,400	1,870
Beef Branch	30,180	72,120	1,865
Central City	35,080	12,780	890
Diamond	45,170	.....	765
Spurgeon	20,250	11,830	340
Totals	10,888,230	1,303,860	$222,080
Ten weeks	98,809,270	12,348,350	$1,972,165

Zinc value, the week, $185,535; ten weeks, $1,633,280.
Lead value, the week, $36,545; ten weeks, $338,885.

Compared with the same week of last year the shipment this week is greater by 795 tons of zinc and 205 tons of lead, and in value of both ores the increase amounts to $49,475. The gain of the ten weeks of this year to date aggregates 6,216 tons of zinc and 1,182 tons of lead, at an increase in value of $377,075 over the first ten weeks of last year.

Since the week ending January 23, when the reserve stock was estimated at 6,400 tons, it has been reduced in six weeks one-half, leaving not to exceed 3,200 tons now in the bins, a large amount of which is sold. An average reduction of over 500 tons per week is conceded to be cutting down the reserve at an almost alarming rate.

Average Prices of Metals per lb., New York.

Mo.	Tin.		Lead.		Spelter.	
	1903.	1904.	1903.	1904.	1903.	1904.
Jan...	28.33	28.845	4.075	4.347	4.865	4.863
Feb..	29.43	28.087	4.075	4.375	5.043	4.916
Mar..	30.15	.....	4.442	.....	5.349	....
April.	29.81	.....	4.567	.....	5.550	....
May..	29.51	.....	4.325	.....	5.639	....
June..	28.34	.....	4.210	.....	5.697	....
July..	27.68	.....	4.075	.....	5.662	....
Aug..	28.29	.....	4.075	.....	5.725	....
Sept..	28.77	.....	4.243	.....	5.686	....
Oct..	25.92	.....	4.375	.....	5.510	....
Nov..	25.42	.....	4.218	.....	5.438	....
Dec...	27.41	.....	4.162	.....	4.731	....
Year	28.09	.....	4.237	.....	5.400	....

NOTE.—The average price of spelter in St. Louis for the month of January, 1904, was 4.673c. per lb.; February, 4.717c.

Average Prices of Copper.

Mo.	New York.				London.	
	Electrolytic.		Lake.		Standard.	
	1903.	1904.	1903.	1904.	1903.	1904.
Jan...	12.159	12.410	12.361	12.553	53.52	57.55
Feb...	12.778	12.063	12.901	12.245	57.34	56.57
Mar..	14.416	.....	14.572	.....	63 85	.....
April.	14.454	.....	14.642	.....	61.72	.....
May..	14.435	.....	14.618	.....	61.73	.....
June.	13.842	.....	14.212	.....	57.30	.....
July..	13.094	.....	13.341	.....	56.64	.....
Aug..	12.962	.....	13.159	.....	58.44	.....
Sept..	13.205	.....	13.345	.....	56.82	.....
Oct...	12.801	.....	12.954	.....	55 60	.....
Nov..	12.617	.....	12.813	.....	56.30	.....
Dec..	11.952	.....	12.084	.....	56.36	.....
Year	13.235	.....	13.417	.....	57.97	.....

New York prices are in cents, per pound; London prices in pounds sterling, per long ton of 2,240 lbs., standard copper. The prices for electrolytic copper are for cakes, ingots or wire bars: prices of cathodes are usually 0.25 cent lower.

Average Prices of Silver, per ounce Troy.

Mo.	1902.		1903.		1904.	
	London. Pence.	N. Y., Cents.	London Pence.	N. Y., Cents.	London, Pence.	N. Y., Cents.
Jan..	25.92	55.56	21.98	45.57	26 423	57.055
Feb..	25.41	55.09	22.11	47.89	26.665	57.592
Mar..	25.00	54.23	22.49	48.72	.....	.....
April.	24.34	52 72	23.38	50.56	.....	.....
May..	23.71	51.31	24.89	54.11	.....	.....
June.	24.17	52.36	24.29	52.86	.....	.....
July..	24.38	52.88	24.86	53.92	.....	.....
Aug..	24.23	52.52	25.63	55.36	.....	.....
Sept..	23.88	51.52	26.75	58.00	.....	.....
Oct...	23.40	50.57	27.89	60.36	.....	.....
Nov..	22.70	49.07	27.01	58.11	.....	.....
Dec...	22.21	48.03	25.73	55.375	.....	.....
Year	24.09	52.16	24.75	53 45	.....	.....

The New York prices are per fine ounce; the London quotation is per standard ounce, .925 fine.

ASSESSMENTS.

Company.	Delinquent.	Sale.	Amount.
Best & Belcher, Nev.	Mar. 18	Apr. 8	.10
Brunswick Con., Cal.	Apr. 5	.....	.03
Dexter Tuscarora, Nev.	Apr. 8	Apr. 21	.07
Martha Wash'gt'n, Utah.	Mar. 19	Apr. 9	.01
Potosi, Nev.	Mar. 16	Apr. 7	.10
Scorpion, Nev.	Mar. 17	.....	.05
Sierra Nevada, Nev.	Mar. 15	Apr. 4	.10

DIVIDENDS.

Company.	Latest Dividend. Payable.	Rate.	Total.	Total to date.
†Calumet & Ariz.	Mar. 19	1.50	$300,000	$700,000
*Calumet & Hecla.	Mar. 22	10.00	1,000,000	84,350,000
*Central Lead, Mo.	Mar. 15	.50	5,000	395,000
*Century, Utah	Mar. 5	.02	3,000	18,000
*Bunker Hill & Sull.	Mar. 4	.15	45,000	1,628,000
*Daly West, Utah.	Mar. 15	.65	117,000	3,842,000
*Dos Estrellas, Mex.	Mar. 15	4.50	13,500	632,575
†Federal Sm., pf.	Mar. 15	1.75	183,750	367,500
†General Chem, pf.	Apr. 1	1.50	150,000	2,875,178
†Iron Silver, Colo.	Apr. 1	.10	50,000	2,959,000
*Kendall, Mont.	Mar. 20	.05	25,000	405,000
Mines Co. of Am.	Mar. 20	.01¼	25,000	530,000
*Natividad, Mex.	Mar. 15	5.00	12,000	308,463
Ophir, Nev.	Mar. 4	.25	25,200	1,671,400
*Pacific Cst. Borax.	Mar. 29	1.00	19,000	1,592,500
‡Penna. Salt	Apr. 15	3.00	180,000	13,630,000
*Penn. Con., Cal.	Mar. 15	.10	5,150	202,525
Sacramento, Utah	Mar. 1	.00½	5,000	198,000
†St. Jos. Lead, Mo.	Mar. 15	.15	56,250	3,890,750
†Standard Oil	Mar. 15	16.00	15,520,000	222,235,000
‡Wolverine Copper.	Apr. 1	3.50	210,000	1,530,000

* Monthly. † Quarterly. ‡ Semi-annually.

STOCK QUOTATIONS

NEW YORK.

Company.	Par val.	Mar. 2 H.	Mar. 2 L.	Mar. 3 H.	Mar. 3 L.	Mar. 4 H.	Mar. 4 L.	Mar. 5 H.	Mar. 5 L.	Mar. 7 H.	Mar. 7 L.	Mar. 8 H.	Mar. 8 L.	Sales.
Acacia	$1													
Amalgamated, c.	100	47	46⅝	47	46⅝	47⅜	46⅝	48¾	45⅝	47	45⅜	49⅛	45⅞	55,375
Anaconda, c.	25									62				10
Anaconda, g.	5													
Belcher, s.	3									30				30
Best & Belcher, s.	3													
Brunswick, g	5													
Bullion, s.	1							10						200
Caledonia, s.	1	1.20						1.20				1.20		400
Challenge, s.	2½									36				100
Chollar, s., g.	2½			20								19		400
Confidence	3					1.15								300
Con. Cal. & Va., g.s.	2½	1.50		1.50				1.55		1.60		1.60		800
Con. Imperial, s.	1					.03½								500
Cripple Creek, g.	1							07				07		1,100
Crown Point	2½									23				400
Elkton, g.	1	69		69	58	72	70	72				70		1,400
El Paso, g.	1	70						75						1,000
Gold Dollar, g.	1													
Gould & Curry	1	44		42	41									600
Greene Con., c.	10	10⅞	10⅜	10¼	10⅛	10¼	10⅛	10½	10¼	10¾	10⅛	10⅜	10¼	8,903
Hale & Norcross	3			92		98				88		93		600
Homestake, g.	100													
Horn Silver	20													
Isabella, g.	1	34						34				34	33	1,500
Jack Pot, g.	1													
Julia, s.	1							04						300
Justice, s.	2													
Kentuck, s.	1					.03								500
Leadville, s. l.	10			03										500
Little Chief, g. s.	50	08												300
Mexican, s.	3	1.75		1.90				1.89		2.10				600
Mollie Gibson, g.	5	07								07½				1,300
Moon Anchor, q.	5													
Occidental, s.	3													
Ontario, s. l.	100	4.40		4.35										45
Ophir, s.	3	4.75		5.00		4.90								350
Overman, s.	2					.33	32							600
Pharmacist, g.	1													
Phœnix, g.	1									09		09		400
Portland, g.	1			1.90		1.90						1.90		300
Potosi, s.	1	18		19		19		26		27		28		1,200
Quicksilver, Pf.	100													
Savage, s.	3			70				67	66					300
Sierra Nevada, s.	3											60		500
Silver Hill, g. s.	1			70										100
Small Hopes				26										200
StandardCon., g. s.	10	2.65												100
Tennessee, c.	25													
Union Con., g. s.	1			90	88							85		70
Union Copper	10	⅝		⅝		⅝		⅝		⅝				2,200
United, com., c.	100													
Utah, s.	1													
White Knob, c.	10	8¼	7⅞			8½	8	8¼	8	8⅛	8			1,600
Work, g.	1			08						08½				3,500
Yellow Jacket, s.	3											38		400

c—Copper. g—Gold. l—Lead. s—Silver. Total sales, 89,173 shares. † Ex-dividend. *Holiday.

BOSTON, MASS.

Company.	Par val	Mar. 2 H.	Mar. 2 L.	Mar. 3 H.	Mar. 3 L.	Mar. 4 H.	Mar. 4 L.	Mar. 5 H.	Mar. 5 L.	Mar. 7 H.	Mar. 7 L.	Mar. 8 H.	Mar. 8 L.	Sales.
AdventureCon., c	$25	2¼	2⅛			2		2¼	2			3	2 1/16	345
Aetna, c.														
Allouez, c.	25	3¾	2⅛	3⅛		3¾		3⅛		3⅜		3⅛	3 1/16	1,200
Amalgamated, c.	100	47⅛	3½	47	46⅜	47¼	4⅛	49⅛	45¾	48⅝	4⅛	49⅜	45⅝	10,111
Am. Gold Dredg.	5													
Am. Z., L. & Sm.	25							8¼						50
Anaconda, c. s.	25			40								16		13
Arcadian, c.	25									50				45
Arnold, c.	25													
Atlantic, c.	25							7⅛				7¾	7½	160
Bingham Con.	50	13½	19	19		19½	19	19½	19¼			19		527
Bonanza Dev. g.	10													
British Col., c.	5													
Calumet & Hecla	25	440		445	440			445		445		440		24
Centennial, c.	25	17¼	17	17⅜	17¼	17⅛		17		17½		17¼	17	340
Central Oil.	25	7												50
Con. Mercur, g.	5	60		60		62	60	60				65	60	1,671
Copper Range	100	40¾	39½	41	40¼	41½	4 1/16	40⅞	40¾	41	40	40½	40¼	5,127
Daly West, g. s. l	20	35	34¼	34½	34¼	34¼	34⅛	34¼	34	34⅜	34	34⅜	34⅛	1,497
†Dominion Coal.	100	57¼	57	57¼	57	55	52	53	51½	53½	52	54	52½	3,648
Preferred	100					108								5
Dominion I. & S.	100					8½		8				7⅞	7¾	360
Elm River, c.	12									2¼	2⅛			100
Franklin, c.	25	8				8		7⅞				7½		126
Granby Con.	10	3¼		3½				3½						1,400
Guanajuato Con.	5			74										100
Isle Royal Con.	25	7½												10
Mass Con., c.	25	4		3⅝				3⅞	3⅝	3¼	3¼	3¾		435
Mayflower, c.	25	50												
Michigan, c.	25	4¾	4⅛	4 1/16		4½		4¾	4¼					343
Mohawk, c.	25	34½	35½	35	35¾			35¾				35¼		30
Mont. Coal & C.	25													497
Mont'l & Boston.	5	50												10
New Idria, q.	5					10	9							5
Nova Scotia St.	100													
Preferred	100													
Old Colony, c.	25							75						10
Old Dominion, c.	25					10		10¾	10½	10½		10⅜		200
Osceola, c.	25	57	56	57½	57	57½	57¼	57½	56¼	57¼	55½	57	56½	934
Parrot, s. c.	10	23⅛	23	23								22⅜		950
Phœnix Con, c.	25			1⅞	1½			1½				1½		113
Quincy, c.	25					85	83							31
Rhode Island, c.	25	75				1		75						25
Santa Fe, g. c.	10													
Shannon, c.	10	8		8	7⅛	7⅞	7¾					8		945
Tamarack, c.	25									95		95		3
Tecumseh, c.	25													
Tennessee, c.	25													
Trinity, c.	25	4¾	4⅝	4¾	4½					4¾	4½	4⅝	4½	585
United c.	100													
United States, g.	10	20½	20	20¼	20	20⅛	20⅛	20⅛	20⅛	20⅜	20¼	20⅛	20	4,568
U. S. Coal & Oil.	25							8¾		8¾		9		200
Utah Con., g. c.	5	33⅜	33⅛	33⅜	33¼	33⅞	33¾	33⅝	33	34⅛	33	34¼	33⅞	4,379
Victoria, c.	25	3¼				3¼		3¼	3	3		3½	3⅛	345
Winona, c.	25	5½	5⅜	5⅞	5½	5⅝								538
Wolverine, c.	25	73½		74		75	74	74⅜	74	74⅛	73½	74		474
Wyandot, c.	25	57		57		62½				70				450

*Holiday. †Ex-dividend. ‡Assessment Paid. Total sales, 43,211 shares.
c—Copper g—Gold. l—Lead. q—Quicksilver. s—Silver.

Duluth, Minn.

Company	Par Val.	Bid.	Asked.	Company	Par Val.	Bid.	Asked.
Calumet & Arizona	$10	$110	$111	Lake Sup. & Pitts.	$10	$130	$135
Calumet & Bisbee	10	7.50	8.00	Pitts. & Duluth	10	50.00	51.00
Calumet & Cochise	10	7.50	8.00	Shakespeare			.20
Calumet & Pittsburg	10	33.50	35.00	United Mexican			.50
Higgins Dev.	10	3.00		Wolv. & Arizona	10	4.00	
Junction Dev.	10	14.00	14.50	Yaqui	10		1.50

COAL, IRON AND INDUSTRIAL STOCKS.

Company.	Par val.	Mar. 2 H.	Mar. 2 L.	Mar. 3 H.	Mar. 3 L.	Mar. 4 H.	Mar. 4 L.	Mar. 5 H.	Mar. 5 L.	Mar. 7 H.	Mar. 7 L.	Mar. 8 H.	Mar. 8 L.	Sales
Allis-Chalmers	$100	12¾												
Preferred	100									66	55¼	55	53	800
Am. Agr. Chem	100													10
Preferred	100													
Am. Sm. & Ref.	100			47½						47½				570
Preferred	100			90¾	90	90¾				90¾		91		610
Col. Fuel & I.	100	31				31	30⅝	30				30	29½	2,350
Preferred	10											59½		20
Col. & H. C. & I.	100	12		12¼	11⅜			12½				12	11¾	1,050
Crucible Steel	100							4				4		450
*Preferred	100	27½		27½		28½	27⅜	29	28⅝	28¾	28⅛	28⅜	28	986
General Chem.	100													
Preferred	100											95		100
Mong. R. Coal	50													
*Preferred	100	24		24¼	24			24				24¼	24	23 652
National Lead	100					15⅜	14⅜					14⅝	14½	1,200
Preferred	100													
*Phila. Nat. Gas.	100	33⅜		34½										110
*Preferred	100													
*Pittsburg Coal	100	13		13		13		13						1,275
*Preferred	100			48¼	48	48¼	48	48½				49	48½	49 48¾ 670
Republic I. & S.	100					7½		7⅝				7½		7⅝ 7½ 800
Preferred	100			42½		41⅜		42						43 41¾ 680
Sloss-Shef S. & I.	100	36½												36½ 280
Preferred	100					80½								107
Standard Oil	100	620	618	620		627		627	625	622				87
Tenn. C. I. & R. R.	100					36½		35¾		36	35½	36		550
U.S. Red. & Ref.	100													
Preferred	100													
U.S. Steel Corp.	100	11¼	11	11¼	11	11¼	11	11		11	10⅝	11	10⅝	22,539
Preferred	100	56⅜	56⅛	56¼	56¼	56⅜	56⅜	56¼		56	54⅞	56½	55	60,644
Va.-Car Chem.	100	29½	29	30½	29½	31½	31	30		30¼	30	30½	29½	3,440
Preferred	100													

*Pittsburg exchanges. †Holiday. ‡Ex. dividend. Total sales, 99,880.

COLORADO SPRINGS, COLO.

Company.	Par Val	Feb. 27 H.	Feb. 27 L.	Feb. 29 H.	Feb. 29 L.	Mar. 1 H.	Mar. 1 L.	Mar. 2 H.	Mar. 2 L.	Mar. 3 H.	Mar. 3 L.	Mar. 4 H.	Mar. 4 L.	Sales
Acacia	$1	.07¼	.06½	06⅞	.06⅛	.07	.06¾	.07	.06½	.0 ⅝	.06	.06½	.06	1,000
American Con.	1													
Anaconda	5	.16	.15	.16	.15	.16	.15	.16	.15	.17	.15	.16½		4,500
Colo. City & M.	1	.03⅛	.2⅜	.03½	.02¾	.03⅛	.02¾	.03	.02¾	.03	.02¾	.03	.02¾	2,000
C. K. & N.	1	.20	.18½	.20	.19	.20	19	19½	.19	.20	.19	19½	.19	9,000
Cripple Ck. Con.	1	.07¾	07½	.07¾	.07⅝	.07⅝	.07⅝	.07¾	.07⅝	.07¾	.07⅝	.07¾	.07¾	11,000
Des Moines	1	.02½		.02½		.02½	.02⅜	.02¾	.02⅜	.02½	.02¼	.02¼	.02½	
Doctor Jack Pot	1	.09¾	.08¾	.09¾		.03½		10		.09	.08	.09½	.08	
Elkton Con.	1	.64	.63½	.65	.65	.65	.65	.67¼	.67	.68½	.68¾	.68½	.68¾	22,800
El Paso	1	.70	.69⅝	.70½	.70	.72	.71	.74	.72½	.76½	.75	.76¾	.76	12,000
Gold Dollar Con.	1	.05¼	.05¼	.05¼	.05	.05¼	.09	.05⅜	.05	.05¼	.05	.05	.04⅞	2,100
Gold Sovereign	1	.04	.03⅜	.04	.03¾	.04	.03¾	.04	.03⅞	.04	.03⅞	.04	.03⅞	2,800
Golden Cycle	1	.51½	.51	.51½	.51⅜	.51⅜	.51⅛	.51		.51		.51		1,000
Golden Fleece	1	.04		.04		.04		.02		.02		.02		
Hart	1	.03½	.02½	.03½	.02½	.03½	.02½	.04	.02⅝	.02½		.02¾		
Isabella new	1	.34	.30	.34	.32	.35	.32	.35	.32	.35	.32	.36	.32	2,750
Jack Pot	1			.09	.06⅞	.09		.09	.06½	.08¾	.08	.08½		1,000
Keystone	1	.04⅜	.04¼	.04⅜		.04¼	.04⅛	.04¼	.04	.04¾	.04	.04¼	.04	17,000
Last Dollar	1	.45		.45		.45		.45		.45				
Lexington	1	.04½	.04¼	.04½	.04¼	.04½	.04¼	.04½	.04¼	.04½	.04¼	.04⅜	.04⅛	
Little Puck	1	.03⅞	.03⅜	.04	.03⅞	.03⅞	.03⅝	.03⅞	.03⅝	.03⅞	.03⅝	.03⅝	.03½	10,000
Mollie Gibson	1	.08½	.05	.08½	.05½	.08½	.05	.07	.05	.0 ½	.05	.07½	.05½	
Moon-Anchor	5	11		.11	.10	.11	.09	.10	.09½	.11	.09½	.09½		1,000
New Haven	5	.02⅝	.02½	.02½		.03	.02½	.03	.02⅝	.02¾	.02⅝	.02⅝	.02⅝	4,000
Old Gold	1	10	.09¾	.10	.09½	.10	.09⅞	.10	.09¾	.10	.09⅞	.10	.09⅞	6,500
Pharmacist	1	.04¾	.04½	.04½	.04½	.04½		.04¾	.04	.04½	.04	.04½	.04	
Pinnacle	1	.04		.03¾	.03	.04		.03¾		.03½		.04		
Portland	1	1.95	1.75	1.95	1.75	1.95	1.50	1.95	1.70	1.90	1.70	1.90	1.60	100
Vindicator Con.	1	.65½	.64½	.66	.64	.65	.63	.65	.63	.65	.60	.63	.60⅜	5,000
Work	1	.06¼	.06	.06¾	.06¼	.06⅝	.06½	.06⅞	.06¾	.06¾	.06⅝	.06¾	.06⅜	11,000

Total sales, 122,750 shares.

COLORADO SPRINGS (By Telegraph).

Company.	Mar. 7. H.	Mar. 7. L.	Mar. 8. H.	Mar. 8. L.	Company.	Mar. 7. H.	Mar. 7. L.	Mar. 8. H.	Mar. 8. L.
Anaconda	.16	.15	.16	.15	Jack Pot	.08½	.06½	.09¼	.06
Cripple Ck Con.	.07⅞	.07⅛	.07¾	.07¼	Last Dollar	.45	.40	.45	.40
C. K. & N.	.19½	.19	.19½	.19	Mollie Gibson	.05½	.05¼	.07	.05
Doctor-Jack Pot	.09	.08	.09½	.06	Moon Anchor	.10	.09½	.11	.09½
Elkton Con	.68	.67	.67	.67½	Old Gold	.11	.09	.09¾	.09⅜
El Paso	.78	.77½	.73½	.72½	Pharmacist	.04¼	.04	.04¾	.04
Gold Dollar Con.	.05	.04⅞	.05½	.04¾	Portland	1.90	1.50	1.90	1.50
Gold Sovereign	.04	.03⅞	.04	.03⅞	Vindicator	.60	.58	.61	.58
Isabella	.34	.32	.34	.32	Work	.06½	.06⅜	.06½	.06⅛

SAN FRANCISCO.

Company.	Location.	Feb. 25 H.	Feb. 25 L.	Feb. 26 H.	Feb. 26 L.	Feb. 27 H.	Feb. 27 L.	Feb. 29 H.	Feb. 29 L.	Mar. 1 H.	Mar. 1 L.	Mar. 2 H.	Mar. 2 L.	Sales
Central Eureka	Cal													
Golconda	Ore.	.08												500
Golden Anchor	Nev.										.23			
Hannapah	Nev.													
Lightner Mg. Co.	Nev.													
MacNamara	Nev.	.19		.20		.19	.18	.19	.18	.20	.19			5,400
Mont. Tonopah	Nev.	1.37½	1.35	1.35	1.30	1.32½	1.30	1.32½	1.25	1.27½	1.25	1.25	1.22½	8,165
Penna. C. M. Co.	Cal													
South Eureka	Cal													
Ton. Belmont	Nev.	.52	.50	.52	.51	.51	.53	.60	.57	.61	.58	.64	.59	13,000
Ton. Midway	Cal	.40		.40		.39		.39		.39		.42	.38	6,987
Ton. Mg. Co.	Nev.			5.75										100
Ton. North Star	Nev.	.33		.34						32		.31		700
Ton. & Salt Lake	Nev.													
Ton. Superior	Nev.													
Wild Goose	Ala.							2.30						105

San Francisco and Tonopah Mining Exchange.
Total sales, 34,957 shares.

SAN FRANCISCO (By Telegraph).

Company.	March 7.	March 8.	Name of Company.	March 7.	March 8.
Belcher	26	25	Gould & Curry	.41	.41
Best & Belcher	2.00	2.05	Hale & Norcross	.85	.91
Caledonia	1.15	1.10	Mexican	1.70	1.70
Challenge Con.	.35	.34	Ophir	4.85	4.55
Chollar	.18	.17	Overman	.28	.25
Confidence	1.10	1.05	Sierra Nevada	.51	.51
Con. California & Virginia	1.65	1.70	Union Con.	.84	.83
Crown Point	.19	.19	Yellow Jacket	37	.35

STOCK QUOTATIONS

MEXICO.* Feb. 26

Company.	Shares Issued.	Prices. Bid.	Ask.
Durango:			
Ca. Min. de Penoles..	2,500	$3,800	$4,100
San Andres de la Sierra	200	10,000	.....
Guanajuato:			
Angustias, Pozos....	2,400	55	58
Cinco Senores y An., aviadoras	2,000	55	62
Cinco Senores y An., aviada	400	58	65
Providencia, San Juan de la Luz	6,000	60	65
Queensland y Australia	300	75	80
Guerrero:			
Delfina, 1st serie....	2,500	52	55
Delfina, 2nd serie....	2,500	35	40
Garduno y Anexas...	7,200	30	40
Hidalgo:			
Amistad y Condordia	9,600	81	82
Carmen, aviada	1,100	50	90
Guadalupe Fresnillo Mill	1,000	170	200
Guadalupe Fresnillo Mine	1,400	70	80
La Blanca, aviadora.	1,536	.....	.....
La Blanca, aviada....	768	.....	.....
La Reina y An., aviadora	5,600	12	15
Luz de Maravillas, aviadas	1,100	.....	20
Maravillas y An., aviador	1,680	120	140
Maravillas el Lobo ..	1,000	130	180
Palma y An., aviador	1,800	14	20
Real del Monte	2,554	.....	.....
Refugio, aviada.....	12,800	5	7
Santa Anay An., aviadora	1,800	85	100
Santa Anay An., aviada	600	30	40
Sta. Gertrudis y An., aviadas	9,600	13	15
Sta. Gertrudis y An., aviadora	28,800	54	85
Santo Tomas Apostol aviadoras	5,100	2	3
San Felipe de Jesus, aviadora	3,600	17	20
San Felipe de Jesus, aviada	1,200	6	10
San Rafael y An., Trompillo	1,200	1,680	1,700
San Rafael y An., aviada	1,200	662	670
Soledad, aviada.....	960	660	680
Sorpresa, aviada. ...	960	290	300
.....	.....	.....	.....

Name of Company.	Shares Issued.	Prices. Bid.	Ask.
Mexico:			
Alacran	2,400	20	25
Aldebarren	2,000	40	50
Buen Despacho	3,000	40	44
Dos Estrellas	3,000	1,500	1,650
La Esperanza (El Oro.)	3,000	1,500	1,500
La Reformia, aviadores	2,000	24	28
Providencia, pagadoras	1,600	.....	.....
Providencia, liberadas	900	.....	.....
Santa Ana, Esperanza	2,400	90	.....
Michoacan:			
Luz de Borda, aviadora	3,000	60	75
Luz de Borda, aviado	1,000	30	40
Santiago y An., Tlal..	4,000	5	8
Nuevo Leon;			
La Fraternal	1,000	580	620
Norias de Bajan	1,000	880	920
San Luis Potosi:			
Concepcion y An.	3,000	73	80
El Barreno, aviadora.	2,000	45	50
Sta. Maria de la Paz..	2,400	158	162
San Diegoy Annexas.	2,400	8	10
Zacatecas:			
Asturiana y An.	2,500	35	45
Candelaria y Pinos..	2,500	130	140
Cubiertas	2,400	.....	.....
Esperanza y An.	2,400	6	8
Lourdes	2,500	22	27
Luz de Minillas, pagadoras	2,000	15	30
Nueva Quebradilla, aviadoras	2,400	65	90
Nueva Quebradilla, aviadas	600	50	70
San Carlos y Annexas	2,500	50	60
Sta. Maria de Gaud..	2,500	64	70
Miscellaneous:			
Bartolome de Medina	2,000	70	80
Guadalupe Hacienda	20,000	.....	.....
La Luz Hac. (Pachuca.)	3,750	.....	.....
La Reina (Chihuahua.)	192	.....	.....
Naica (Chihuahua.)..	100	11,000	13,000
Natividad (Oaxaca) aviadora	1,800	950	100
Natividad (Oaxaca) aviadas	600	.....	.....
San Francisco Hac..	6,000	64	70
Santa Ana Huantla Morelos	4,000	.....	.....
Union Hacienda.....	3,000	215	230

*Values are in Mexican currency.

TORONTO, ONT. March 5

Company.	Par val	Prices. High.	Low.	Sales
Black Tail, g....	$1	.04	.02	.....
Cariboo-McKin	1	.03	.....	.....
Cariboo-Hydr.....	1	.70	.....	.....
Center Star, g. s....	1	.24	.22	.....
Crows Nest, C.C....	100	2.60	2.00	.....
Dominion Coal	100	.57	.56	.....
Dominion S. & I. ..	100	.08½	.07½	.....
Fairview, g. s.... ..	1	.04	.02	.....
Giant, g. s.....	1	.....	.....	.....
Deer Trail, g. s.. .	1	.02	.01	.....
Iron Mask, g. s.....	1	.06	.....	.....
Morrison, g. s.....	1	.04	.02	.....
.....	.....	.....	.....	.....

Company.	Par val	Prices. High.	Low.	Sales
Granby Smelter...	$10	4.25	3.75	.....
Mountain Lion, g.	1	.18	.12	.....
North Star, g. s...	1	.10	.08	.....
Nova Scotia Steel..	100	.....	.....	.....
Payne, s. l.....	1	.14	.09	.....
Rambler Carib ...	1	.35	.25	.....
Republic, g.....	1	.03	.02	.....
St. Eugene, g. s...	1	.40	.30	.....
Virtue, g. s.....	1	.07	.....	.....
War Eagle Con....	1	.14	.09	.....
Sullivan, g. s.....	1	.06	.04	.....
Winnipeg, g. s....	1	.04	.....	.....
Wonderful, g. s..	1	.03	.....	.....

g—Gold. l—Lead. s—Silver. Total sales, none.

SALT LAKE CITY.* March 5

Company	Par Val	High	Low	Sales.
Ajax	10	.05¾	.05½	9,700
Butler Liberal.	....	.10¼	.10¼	2,250
Cariss.	1	.08¼	.08	2,000
Century	1	76½	76	200
Con. Mercur...	1	.60	.56¼	2,500
Daly	20	217½	2.20	200
Daly-Judge	....	4.15	4.60	359
Daly West.	½	34.50	34.00	455
Dalton	....	¼	¼	1,000
Egl. & Blue Bell	....	.50	.50	2,000
Ingot	1	.01¾	.01⅝	1,500
Joe Bowers	¼	⅛	⅛	2,000
La Reine	....	.03¼	.03	3,000
Little Chief	....	.01⅛	.01	10,500

Name of Company	Par Val	High	Low	Sales.
L. Mammoth..	½	42	.41½	1,000
May Day	....	.07	.07	2,500
Mammoth	....	1.10	1.10	100
N. Y. Bonanza	5	.13	.11½	7,500
Petro.	....	.08	.08	800
Sacramento	1	.22	.21	2,000
Silver Shield ..	1	.01	.01	2,750
Star Con	....	.17¾	.16	4,800
Swansea	1	.27½	.27½	100
Tetro	....	.34	.33	4,000
Utah	1	.55	.55	600
Wabash	1	½	½	2,033
Yankee Con	....	.48¼	.34½	2,400
.....	.....	.....	.....	.....

*By our Special Correspondent. All mines are in Utah. Total sales, 70,847 shares.

PHILADELPHIA, PA.

Company.	Par val.	Mar. 2 H.	L.	Mar. 3 H.	L.	Mar. 4 H.	L.	Mar. 5 H.	L.	Mar. 7 H.	L.	Mar. 8 H.	L.	Sales
Am. Cement.	$10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cambria Iron	50	46½	.....	.....	.....	46¾	.....	.....	.....	.....	.....	.....	.....	40
Cambria Steel	50	18⅞	.....	19	.....	19¼	.....	19	.....	.....	.....	19¼	.....	39
Pa. Steel, pfd.	100	75	.....	75	.....	.....	.....	.....	.....	.....	.....	75	.....	158
Susq. I. & S..	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
United Gas I.	50	83⅝	83⅛	83¼	83	83⅛	83	83⅛	83⅛	83¼	83	83	82¾	1,681
Lehigh Nav'n	50	65⅛	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Philadelphia .	50	38¾	38⅞	38¾	38	38⅛	38¼	38¼	.....	38	.....	38¼	38	3,385
U.S. Steel.....	100	11	10⅞	11⅛	11	.....	.....	11	.....	.....	.....	10⅞	.....	1,610
U.S. Steel. pf.	100	56⅝	56¼	56¼	.....	56⅝	.....	56¼	55¼	56	55	56	56⅛	6,835

†Ex-Dividend Total sales 14,138.

LONDON. Feb. 26

Company.	Shares Issued.	Par value. £. s. d.	Latest dividend. Amt. s. d.	Date.	Quotations. Buyers. £. s. d.	Sellers. £. s. d.
American:						
Alaska-Treadwell.....	200,000	5 0 0	1 6	Feb., 1904	4 5 0	4 7 6
Anaconda.....	1,200,000	5 0 0	2 0	Nov., 1903	3 2 6	3 5 0
Camp Bird.....	820,000	1 0 0	9	Feb., 1904	1 2 6	1 5 0
Copiapo.....	112,500	2 0 0	6 10	May, 1903	1 5 0	1 10 0
De Lamar.....	80,000	1 0 0	2 0	Oct., 1903	8 9	11 3
El Oro.....	1,080,000	1 0 0	9	Jan., 1904	1 1 3	1 3 9
Frontino & Bolivia.....	128,682	1 0 0	3 0	July, 1901	3 9	6 3
Le Roi.....	200,000	5 0 0	5 0	Nov., 1899	16 3	18 9
*Le Roi No. 2.....	120,000	5 0 0	1 0	Feb. 1904	11 3	13 9
Montana.....	657,128	1 0 0	6	April, 1899	1 0	1 6
Standard.....	500,000	4 0	2½	Sept., 1903	3 0	4 0
Stratton Independence.	1,000,007	1 0 0	6	Dec., 1903	3 9	4 3
St. John del Rey.....	546,265	1 0 0	6	Dec., 1903	14 0	15 0
Tomboy.....	300,000	1 0 0	1 0	June, 1902	1 7 6	1 12 6
Utah.....	300,000	1 0 0	6 3	Jan., 1904	6 10 0	6 15 0
Ymir.....	200,000	1 0 0	1 0	Mar., 1902	1 3	3 9
European:						
Linares.....	15,000	3 0 0	1 0	Mar., 1903	2 6 0	2 10 0
Mason & Barry.....	185,172	1 0 0	11 0	May, 1903	3 12 6	3 17 6
Rio Tinto.....	325,000	5 0 0	32 6	Nov., 1903	47 2 6	47 7 6
Rio Tinto, preferred....	325,000	5 0 0	2 6	Nov., 1903	5 17 6	6 2 6
Tharsis.....	625,000	2 0 0	6 0	May, 1903	4 5 0	4 10 0
West Australian:						
Associated.....	495,388	1 0 0	2 0	Jan., 1904	2 12 6	2 15 0
Cosmopolitan.....	400,000	1 0 0	1 0	May, 1903	14 3	14 9
Golden Horseshoe.....	300,000	5 0 0	6 0	Nov., 1903	8 1 3	8 3 9
Great Boulder.....	1,750,000	2 0	9	Mar., 1904	1 6 3	1 6 9
Great Fingall.....	250,000	1 0 0	8 0	Jan., 1904	7 17 6	8 0 0
Ivanhoe.....	200,000	5 0 0	5 0	Jan., 1904	8 10 0	8 12 6
Kalgurli.....	120,000	1 0 0	2 6	Jan., 1904	5 10 0	5 12 6
Lake View	250,000	1 0 0	rts.	Aug., 1902	1 1 3	1 3 9
Oroya-Brownhill.....	450,000	1 0 0	2 6	Dec., 1903	3 12 6	3 15 0
Miscellaneous:						
*Brilliant Central	100,000	1 0 0	1 0	Feb., 1904	2 17 6	3 2 6
Briseis.....	600,000	1 0 0	.....	.....	5 6	6 6
*Broken Hill.....	960,000	8 0	1 6	Feb., 1904	1 9 0	1 10 0
Mt. Lyell	275,000	3 0 0	4 3	Sept., 1903	15 0	18 0
Mt. Morgan.....	1,000,000	1 0 0	3	Mar., 1904	1 17 6	2 2 6
Waihi.....	497,412	1 0 0	2 6	Mar., 1904	5 0 0	6 2 6
Indian:						
Champion Reef.....	513,832	10 0	6 6	Jan., 1904	1 15 0	1 17 6
Mysore.....	568,043	10 0	5 6	Mar., 1904	6 10 0	6 12 6
Nundydroog.....	484,000	10 0	1 8	Mar., 1904	2 1 3	2 3 9
Ooregum.....	343,000	10 0	9	Dec., 1903	1 0 0	1 2 6
Ooregum, pfd.....	240,000	10 0	1 9	Dec., 1903	1 7 6	1 10 0
South African:						
*Angelo.....	600,000	1 0 0	4 0	Feb., 1904	6 0 0	6 5 0
*Bonanza.....	200,000	1 0 0	10 0	Feb., 1904	1 16 3	1 18 9
British South Africa....	4,436,019	1 0 0	rts.	May, 1889	1 5 3	1 5 9
Cape Copper.....	300,000	2 0 0	4 0	Jan., 1904	2 10 0	2 15 0
Cape Copper, pfd.....	75,000	2 0 0	1 9	Jan., 1904	2 15 0	3 0 0
*City & Suburban	340,000	4 0 0	8 0	Feb., 1904	6 0 0	6 5 0
Consol. Gold-Fields.....	2,000,000	1 0 0	.....	.....	5 10 0	5 12 6
Crown Reef.....	120,000	1 0 0	20 0	Oct., 1903	15 15 0	16 5 0
De Beers, preferred.....	800,000	2 10 0	10 0	Jan., 1904	18 16 3	18 18 9
De Beers, deferred.....	1,000,000	2 10 0	15 0	Jan., 1904	19 3 9	19 6 3
East Rand.....	900,000	1 0 0	5 0	Aug., 1903	6 1 3	6 3 9
Ferreira.....	90,000	1 0 0	22 6	Feb., 1904	18 15 0	19 5 0
Geldenhuis	200,000	1 0 0	6 0	Feb., 1904	5 0 0	5 5 0
Geduld.....	400,000	1 0 0	rts.	Mar., 1902	5 6 3	5 8 9
Henry Nourse.....	125,000	1 0 0	10 0	Feb., 1904	8 0 0	8 5 0
*Jubilee.....	50,000	1 0 0	5 0	Feb., 1904	3 10 0	3 15 0
Jumpers.....	100,000	1 0 0	5 0	Aug., 1899	2 7 6	2 12 6
*Langlaagte.....	470,000	1 0 0	2 0	Feb., 1904	3 3 9	3 6 3
May.....	288,750	1 0 0	3 6	Feb., 1904	3 15 0	4 0 0
Meyer & Charlton.....	100,000	1 0 0	5 0	Jan., 1904	4 17 6	5 2 6
Modderfontein	290,000	1 0 0	rts.	Apr., 1902	7 0 0	7 2 6
Namaqua.....	94,331	2 0 0	3 0	Dec., 1903	2 17 6	3 2 6
New Jagersfontein..	200,000	5 0 0	10 0	Dec., 1903	27 10 0	28 0 0
New Primrose.....	325,000	1 0 0	3 0	Mar., 1904	3 11 3	3 13 9
Rand.....	1,795,958	5 0	4 0	Aug., 1902	8 15 0	8 16 3
Robinson.....	750,000	5 0 0	5 6	Feb., 1904	9 5 0	9 10 0
Robinson Deep.....	950,000	1 0 0	3 0	Jan., 1904	4 12 6	4 17 6
Rose Deep	425,000	1 0 0	2 6	Feb., 1904	7 2 6	7 7 6
Salisbury.....	100,000	1 0 0	2 0	Mar., 1899	1 10 0	1 15 0
Sheba.....	1,075,000	1 0 0	6	July, 1899	7 0	8 0
Village.....	400,000	1 0 0	3 0	Feb., 1904	6 2 6	6 7 6
Wemmer.....	80,000	1 0 0	10 0	Jan., 1904	9 15 0	10 5 0

*Ex-dividend.

LONDON (By Cable.)*

Company.	Mar. 2 £. s. d.	Mar. 9 £. s. d.	Company.	Mar. 2 £. s. d.	Mar. 9 £. s. d.
Anaconda.....	3 5 0	3 5 0	El Oro.....	1 2 6	1 2 6
British So. Africa.	1 12 6	1 11 3	Modderfontein....	7 3 1½	6 16 3
Camp Bird.....	1 3 9	1 3 6	Rand Mines.....	8 15 0	8 12 6
Con. Gold Fields.	5 11 3	5 8 9	Rio Tinto.....	48 17 6	47 7 6
De Beers.....	19 2 6	19 2 6	Simmer & Jack...	1 7 6	1 8 1½
East Rand.....	6 4 7½	5 16 3	Tomboy.....	1 7 6	1 6 3

*Furnished by Wm. P. Bonbright & Co., 15 Wall St., New York.

PARIS. Feb. 25

Company.	Location.	Capital Stock. Francs.	Par value. Fr.	Latest divs. Fr.	Prices. Opening. Fr.	Closing. Fr.
Anzin, Coal.....	France.....	.....	.....	290.00	5,500.00	5,500.00
Boleo, c.....	Lower Cal.....	12,000,000	500	62.50	1,740.00	1,695.00
Champ d'Or, g.....	S. Africa.....	3,375,000	25	3.75	18.00	16.00
Courrieres, Coal.....	France.....	900,000	500	110.00	2,660.00	2,650.00
Fraser River, g.....	Brit. Col.....	250,000	25	.....	5.50	5.50
Huanchaca, s.....	Bolivia.....	40,000,000	125	2.50	73.00	66.00
Laurium, z. l.....	Greece.....	16,300,000	500	25.00	325.00	315.00
Malfidano, z.....	Italy.....	12,500,000	500	50.00	582.00	570.00
Metaux, Cie. Fran. de.....	France.....	25,000,000	500	22.50	464.00	456.00
Mokta-el-Hadid, i. l.....	Algeria.....	18,312,000	500	40.00	825.00	825.00
Nickel, n.....	N. Caledonia..	15,000,000	250	22.50	490.00	500.00
Penarroya, Coal.....	Spain.....	.....	500	45.00	1,070.00	1,042.00
Vielle Montagne z.....	Belgium.....	9,000,000	50	30.00	685.00	670.00
Wyoming, o.....	Wyoming.....	.....	25	.....	356.00	357.00

c—Copper. g—Gold. i—Iron. l—Lead. n—Nickel. o—Oil. s—Silver. z—Zinc.

ST. LOUIS, MO.* March 5

Name.	Par Val.	Prices. Bid.	Ask.	Name.	Par Val.	Prices. Bid.	Ask.
Am.-Nettie, Colo....	$10	$0.30	$0.40	Columbia Lead, Mo.	$10	$3.00	$4.00
Catherine Lead, Mo.	10	1.40	2.00	Con. Coal, Ill.....	100	16.00	18.00
Central Coal & C....	100	58.50	59.50	Doe Run Lead Mo.	100	110.00	115.00
Central C. & C., pf..	100	70.00	71.00	Granite Bimet. Mt..	10	.35	.40
Central Lead, Mo...	100	110.00	115.00	St. Joe Lead, Mo,...	10	14.75	16.00

*By our Special Correspondent.